PCResource

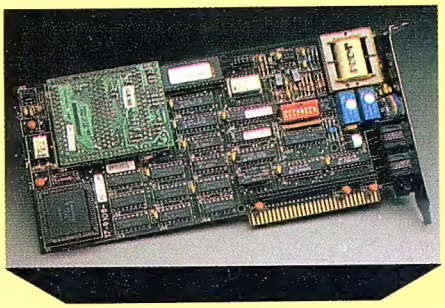
THE HANDS ON GUIDE FOR BUSINESS & PERSONAL PRODUCTIVITY

JULY 1989
U.S.A. $2.95
CANADA $3.95
U.K. £1.95

Word Processors p. 61

FAX

- ☑ What you need
- ☑ What it costs
- ☑ How to install it



How to Manage Your Pop-Up Programs

MS-DOS Insert: Tips for Better Batch Files

Reviews: PC Tools 5.1, Allways 1.0, No-Squint Laptop Cursor

07
0 74470 19563 4

The Dawning of a New Design

The new PRO CORP MOUSE sheds a bright new light on mouse technology. Designed for comfort, the PRO CORP MOUSE fits snugly in the user's hand for fatigue-free desktop operation. Contoured, light-touch keys and the ultra-responsive roller ball allow information to flow effortlessly through your fingertips for high-speed input.

The dawn breaks on distinctive features as well. The PRO CORP MOUSE offers 250 dots per inch resolution when most ordinary mice have only 200 dpi. And PRO CORP is compatible with most PC hardware, including IBM PC/XT, PC/AT, and PS/2—and all popular software. Additionally, the PRO CORP MOUSE carries a Lifetime Warranty.

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(813) 392-7131

PRO CORP MOUSE

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They're everything you want in windowing environments. And less.

DESQview™ is the operating environment that brings OS/2™ power to DOS. And it lets you, with your trusty 8088, 8086, 80286, or 80386 PC, leap into the next generation in PC productivity. For not much money. And without throwing away your favorite software.

Introducing DESQview 2.2

And now, DESQview 2.2 adds capabilities, performance, and compatibility enhancements you've been asking for:

Like being able to fine tune DESQview performance "on the fly." Run Lotus Express and Metro. And the Intel Connection Co Processor. Even use the DOS 4.0 shell with DESQview. Have DESQview automatically install Quattro, Sprint, Aldus PageMaker, Microsoft Excel, Word Perfect, Dataease and as many as 80 other programs. And using the DESQview API, be able to dynamically link them.

More bang; less bytes

While other programs get bigger, we've worked to make DESQview smaller. And we've succeeded in a big way on PCs and PS/2™s with extended, EMS 3.2 (AboveBoard), EEMS and EMS 4.0 memory—as well as on 386 PCs and PS/2s. For example, DESQview overhead on EMS 4.0 and 386 PCs can be as low as 10K on EGA/VGA PCs. And

For programmers, DESQview's API, with its strengths in intertask communications and multitasking, brings a quick and easy way to adapt to the future. With the API's mailboxes and shared programs, programmers are able to design programs running on DOS with capabilities like those of OS/2.

DESQview actually *increases* memory 30K on CGA PCs; 20K on monochrome and Hercules PCs. That's good news for users of big desktop publishing, CAD and database programs.

Introducing DESQview 386

For users of 80386 PCs and PS/2s (or PCs with 80386 add-in boards, such as the Intel Inboard 386), there's DESQview 386 (a combination of DESQview 2.2 and the new QEMM-386 Quarterdeck Expanded Memory Manager, version 4.2).

DESQview 386 gives you extraordinary power. Run text, CGA, EGA, VGA, and Hercules programs in windows and in the background. Run 32-bit 386 programs, like Paradox 386, and IBM Interleaf simultaneously with your favorite DOS programs.

All with the speed and performance you expect out of your 386. And with protection against 'misbehaved' programs.

Promise and performance

And, of course, both DESQviews have all the features that made prior versions the popular choice in operating environments. The ability to multitask in 640K and beyond. View programs in windows or full screen. Transfer data. Access DOS via menus. Dial your phone. And create keystroke macros within and between programs.

Did you buy another environment that hasn't lived up to your expectations? Trade up to new DESQview. See coupon below.

Our story gets better and better

If there's any doubt about our commitment to your PC and PS/2 productivity, just look at our accomplishments over the years. We think you will understand why PC Magazine gave DESQview its Editor's Choice Award for "The Best Alternative to OS/2," why readers of InfoWorld twice voted DESQview "Product of the Year," why, by popular vote at Comdex Fall for two years in a row, DESQview was chosen "Best PC Environment" in PC Tech Journal's Systems Builder Contest.

INFO WORLD 1986 AND 1987 PRODUCT OF THE YEAR

DESQview lets you have it all now.

DESQview System Requirements: IBM Personal Computer and 100% compatibles (with 8086, 8088, 80286, or 80386 processors) with monochrome or color display; IBM Personal System/2• Memory: 640K recommended; for DESQview itself 0-145K• Expanded Memory (Optional): expanded memory boards compatible with the Intel AboveBoard; enhanced expanded memory boards compatible with the AST RAMpage; EMS 4.0 expanded memory boards•Disk: two diskette drives or one diskette drive and a hard disk•Graphics Card (Optional): Hercules, IBM Color/Graphics (CGA). IBM Enhanced Graphics (EGA), IBM Personal System/2 Advanced Graphics (VGA)• Mouse (Optional): Mouse Systems, Microsoft and compatibles• Modem for Auto-Dialer (Optional): Hayes or compatible• Operating System: PC-DOS 2.0-4.0; MS-DOS 2.0-3.3• Software: Most PC-DOS and MS-DOS application programs; programs specific to Microsoft Windows 1.03-2.1, GEM 1.1-3.0, IBM TopView 1.1• Media: DESQview 2.0 is available on either 5-1/4" or 3-1/2" floppy diskette.

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Qty	Product	5-1/4	3-1/2	Price Each	Totals
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	DESQview 2.2 Multitasking windowing environment			$129.95	
	DESQview 2.2 Upgrade from DESQview Version 2.0			$24.95	
	Upgrade from DESQview 1.0 & AST Special Editions)*			$60.00	
	Upgrade from Topview, Windows, Visi-On, etc.)**			$65.00	
	QEMM-386 Version 4.2			$59.95	
	QEMM-386 Version 4.2 Upgrade from QEMM 1.0-4.1*			$19.95	
	Shipping & Handling $5 in USA/ $10 outside USA				
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* Requires DESQview or QEMM-386 registration card on file at Quarterdeck or included with upgrade order; upgrades free to DESQview 2.0 owners who show proof of purchase after August 1, 1988. Quarterdeck priority service users: 33% discount from upgrade price plus sales tax and shipping/handling.

** Just present proof of purchase of any multitasking operating environment—the cover of your manual will do—and send it to us along with the appropriate payment plus shipping, handling and tax.

Circle 208 on Reader Service card.

JULY 1989

PCResource

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Follow the high-tech trend and speed your communications across town or around the world. We'll tell you how it works and what it costs. **PLUS:** Fax boards or standalone machines—the pros and cons. **AND: Greasing the Wheels of Commerce** Some fax success stories.

FIND THE PERFECT WORD PROCESSOR *by Barry Brenesal* **61**
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MAKE YOUR POP-UP PROGRAMS BEHAVE *by G. Michael Vose* **72**
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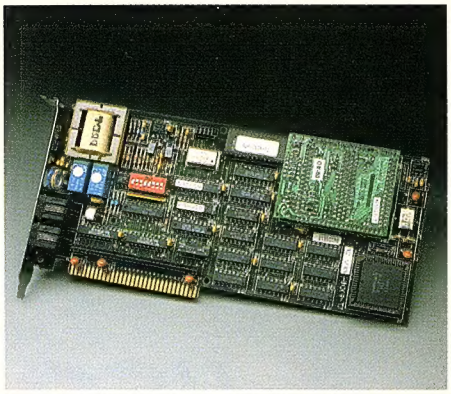

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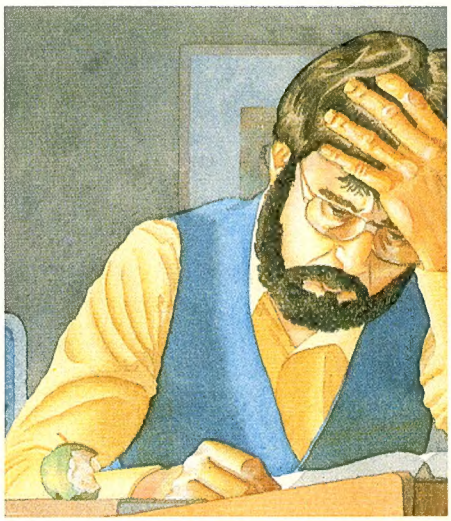

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"SOME VERY BIG THINKING WENT INTO THIS VERY SMALL DESKTOP PC"

#2. Bigger is not necessarily better

Of course, Advanced Digital is not the first computer manufacturer to notice that computer users like smaller computers (our thanks to Steve Jobs).

The POWERLITE System, since it is based on a highly integrated design, has one of the smallest footprints of any computer. It is half the size of conventional AT's, and about 30% smaller than the IBM Model 30.

However, inside this 11⅜ x 15 inch package is some rather impressive computing power. In fact, it compares quite favorably to some very sizable competition.

Features include:

80386SX (16 MHz) or 80286 (20 MHz) CPU
Zero wait-state operation
1 Megabyte RAM, expandable to 5 MB on-board
VGA controller
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...all that thinking has paid off

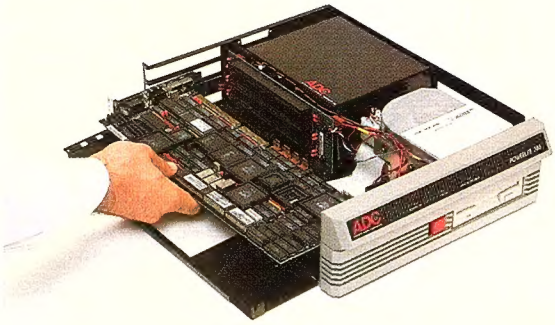
In a world that is literally awash with PCs, the entry of yet another PC into the market is not normally earth-shattering news.

However, the POWERLITE System from Advanced Digital is NOT just another PC.

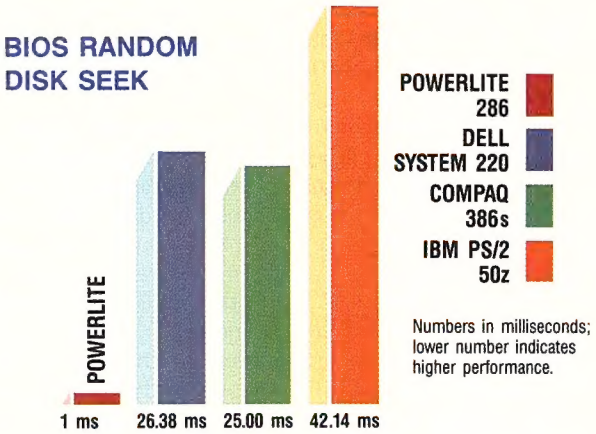
It is often easy to overlook the obvious. That is why our engineers thought long and hard about the design of the POWERLITE System. The result of their thinking can be summarized as follows:

#1. Things change

The POWERLITE System is designed to grow with change, not to be a victim of it. Since the POWERLITE System is based on a modular design, upgrading to a new processor is only a matter of plugging in a board, not of buying a new computer.



Unlike other modular designs, the POWERLITE System integrates a VGA video controller, communication ports and keyboard interface onto the same board that contains the CPU and memory. Until now, it seems that no one noticed that graphics standards have advanced in parallel with processor and memory standards, and that keyboard interfaces also change (try plugging your old PC keyboard into your AT).



POWERLITE 286 Model 141 used for comparison tests. Competitors' test data obtained from the manufacturers' product literature and PC Magazine.

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SECRETS REVEALED

YOU MIGHT WONDER where we get our story ideas. And how we know what you like to read. Well, wonder no more. I'm going to tell you everything. All our secrets for creating this magazine. Right here in this editorial.

First of all, we stay in close touch with new trends in the industry. We get early looks at products like the 4-pound NEC Ultralite laptop, the Compaq Deskpro 386s, and the disk-information utility Magellan. Then we ask ourselves what these things mean to you. What questions do they raise, and what confusion do they create? For example, the NEC laptop is small and lightweight because it uses ROM chips for software. What are ROM chips, and are they a reasonable trade-off from traditional data storage? What do you gain? What do you lose? Answers to these questions make a good story.

Another good story was "The Plain Truth About OS/2" (July 1988). The industry was all abuzz with talk about OS/2, but most people wondered if it offered real advantages. Was there good application software to run on OS/2? Could it run well on a 286 machine? How much memory would it require? What was the cost to convert, and was it worth it? Our technical editor Dave Rowell answered these questions and more in his article.

And what's even better, you liked it. We know that, because you rated it on the Reader Service Card we provide in every issue of the magazine. This is one way you can let us know how we're doing—every month—on every story. Our "You Make the Call" rating code is on page 145 of this issue.

Here are your five top-ranked 1989 stories so far (I'm writing this in May, and tallies have been concluded through April): "Guide to DOS Files, part I (March, page 74); "Guide to DOS Files, part II (April, page 77); "How to Resolve Conflicts with DOS (January, page 87); "Power Up Your PC" (April, page 62); and "Hardware Helper: Printer Perfect—A Maintenance Checklist" (January, page 110).

Since I'm telling secrets here, I'll also reveal your least favorite story during this time frame: "Tax Relief," a review of tax preparation software (March, page 66). I guess we'd all had too much of taxes by then!

Your all-time favorite was about hard drive maintenance: "Be Good to Your Drives" (September 1987). Your all-time least favorite was "Big Leagues" (April 1987), about a program for baseball statistics.

Your response helps. We add to it the results from Reader Surveys and our own phone calls. So we think we know what you want: stories that help you get more out of your hard drive, DOS, and other system components; stories that make sense out of all the different word processing alternatives; or stories that give you insight into which graphics standard you should be supporting. We also think that your interest in educational software is increasing, and that you're looking at scanners to support your graphics needs.

So the secret's out—we listen to you. And now that you know it, we hope you take advantage of it.

Deborah de Peyster

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Suggested Retail Price	**$29.00**	**$49.95**	**$219.98**	**$179.95**
Account Balancer	YES	YES	YES	YES
- Automatic Error Finder	YES	NO	NO	NO
Accounts Can Be Added When Entering Transactions (Data)	YES	YES	YES	NO
Budgeting	YES	YES	YES	YES
- Variable Budgeting By Month	YES	NO	YES	YES
Automatic Transactions	YES	YES	YES	YES
Financial Reports				
- Actual Financial Results	YES	YES	YES	YES
- Month and Year to Date	YES	YES	YES	YES
- All Months On One Report	YES	YES	YES	YES
- Budgeted Financial Results	YES	YES	YES	YES
- Actual Compared to Budget	YES	YES	YES	YES
- Actual Compared to Prior Month	YES	NO	NO	NO
- General Ledger Report	YES	YES	NO	NO
- Accountant's Trial Balance	YES	NO	NO	NO
- Net Worth Computation	YES	NO	YES	YES
Inquiry Reports				
- Check and or Deposit Register	YES	YES	YES	YES
- Account Analysis	YES	YES	YES	YES
- All Transactions with Party	YES	YES	YES	YES
- Cash Requirements Forecast	YES	YES	YES	YES
- Aged Invoices Payable	YES	NO	YES	YES
Graphics	YES	NO	YES	YES
Fiscal Year Support	YES	NO	YES	YES
Optional Password Protection	YES	NO	NO	YES
Financial Calculator	YES	NO	YES	YES
- Prints Amortization Schedules	YES	NO	YES	YES
- Prints Accumulation Schedules	YES	NO	YES	YES
Mail List Manager	YES	NO	YES	YES
- Prints Address Labels	YES	NO	YES	YES
- Prints Index Cards	YES	NO	YES	NO
- Prints Telephone Directory	YES	NO	YES	NO
- Mail Merge with Word Processor	YES	NO	YES	YES
Check Writer	YES	YES	YES	YES
- Prints Laser Checks	YES	YES	YES	NO
- Prints Any Pin-Feed Check	YES	NO	YES	YES
Personal Income Tax Estimator	YES	NO	YES	YES
Pop-up Note Pad	YES	NO	YES	YES
Pop-up Math Calculator	YES	NO	YES	YES
Capacity				
- Total Number of Accounts Per File	999	300	*	120
- Total Number of Open Transactions	100,000	65,535	*	4,000

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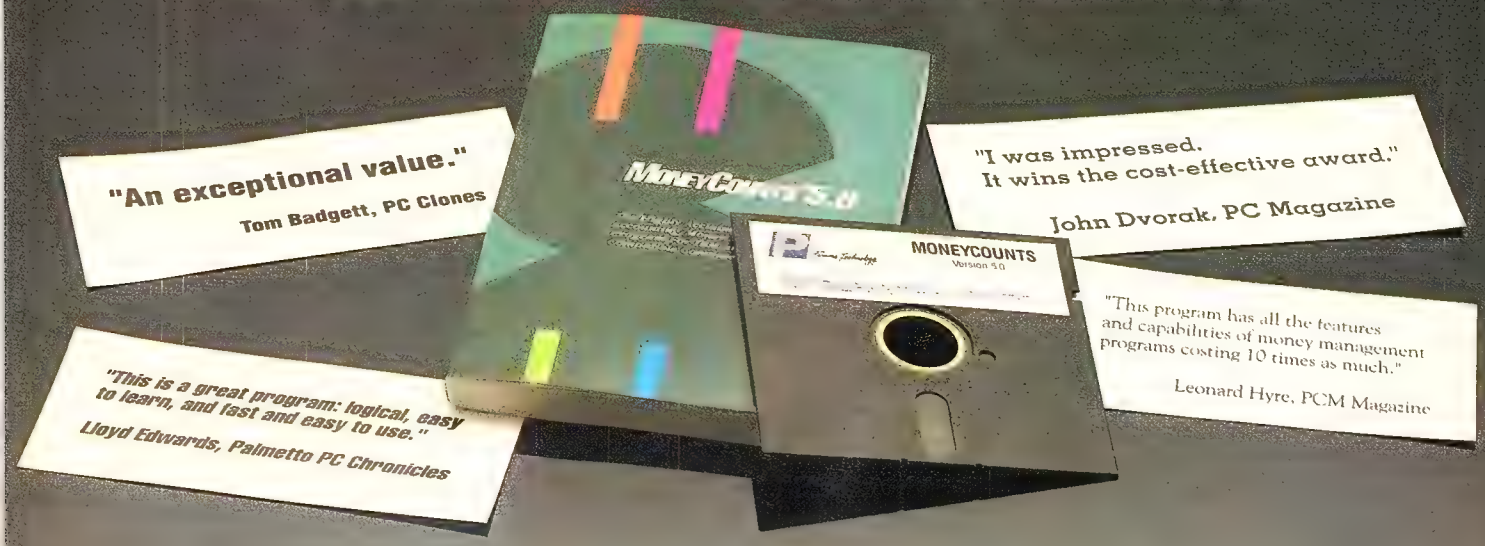

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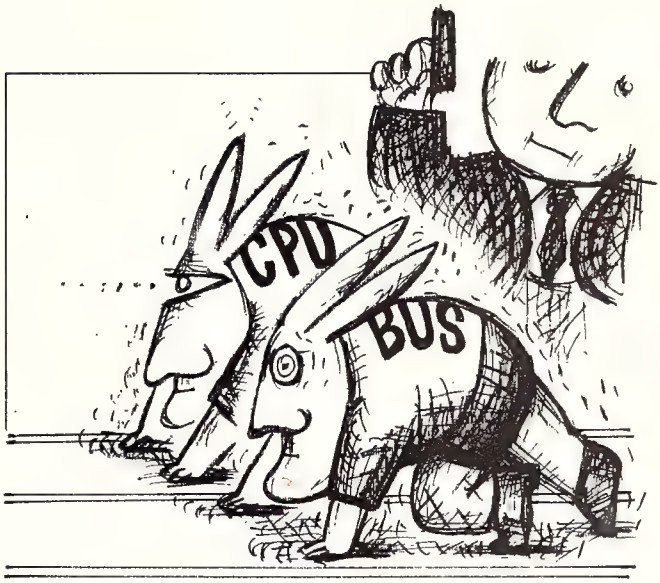

A Speeding Bus (Or Was It a CPU?)

BOY, YOU SHOULD be more careful . . . or am I confused? In the article "Power Up Your PC" (April 1989, page 62), you seem to not know the difference between CPU speeds and bus speeds. This common misunderstanding really should get a good explanation.

I'm sure that Intel Corp. and Boca Research Inc. would not want folks to incorrectly think that their boards were CPU-speed limited (the Intel Aboveboard Plus is rated to a bus speed of 12.5MHz, not to a CPU speed as was stated in the article).

Most LIM-type boards will handle bus speeds above the industry-standard 8MHz bus, but the real problem is that most computer owners don't even know or realize what their system's bus speed really is. Perhaps your fine magazine could run an article about CPU speeds vs. bus speeds so the situation is clear for prospective LIM 4 board purchasers. I think such an article would provide a fine service to your readers.

HERB WAHL
Forksville, Pa.

Thank you, Mr. Wahl. You certainly caught us on this one. We had our bus speeds and CPU speeds mixed up. We also didn't make it clear why these specifications are important to someone who wants to add more memory. We have taken your suggestions to heart and will be running a short article describing the differences between CPU and bus speeds in October. In the meantime, for some good discussion on the meaning of these speeds, see "Blueprint for the Perfect AT" (May 1989, page 50).

—EDS.

HAVING JUST ADDED the Intel Aboveboard Plus to my Leading Edge Model D2, I was very interested in Eric Grevstad's article "Power Up Your PC" (April 1989, page 62). I only wish the article had appeared sooner, as it would have saved me some trouble.

I originally started with the AST Rampage Plus. Like Mr. Grevstad, I was attracted by its state-of-the-art design: 80-nanosecond (ns) SIMM chips and 8MB capacity. But I had trouble with it, too. I couldn't configure the board at all. It hung up on the first menu screen and refused to recognize any memory whatsoever. The vendor—who exchanged it for the Intel board—told me that despite AST's claims of 12MHz compatiblity, it won't run at any clock speed greater than 8MHz.

After reading your article, I wonder if the vendor wasn't referring to bus speed instead of CPU speed. Is it possible that the board worked—albeit imprecisely—in Mr. Grevstad's Dell because it has an 8.33MHz speed? I'm assuming that my Leading Edge has both a CPU speed and bus speed of 10MHz, although I don't know for sure. But that's the only explanation that makes sense, because Mr. Grevstad was able to get the AST board to run in his 12.5MHz CPU Dell, whereas it wouldn't do anything at all in my 10MHz CPU Leading Edge.

SHIRLEY BOOKMAN
Arlington, Va.

More Shareware

YOUR ARTICLE ON shareware (March 1989, page 58) was very well done, with one exception. You totally skipped the category of graphics. Sure, there was a "Graphics and Games" listing, but it only listed games. There are many fine graphics programs for the IBM PC that are shareware.

Oedware's graphics program has been one of the most popular of all shareware programs. PC-KEY-DRAW was the most requested shareware program from the Public Software Library last year. It has been around since 1984 and has undergone many updates and improvements. Thank you for supporting shareware, but please don't forget us graphics programmers.

EDWARD H. KIDERA IV
Oedware
Columbia, Md.

I ENJOYED YOUR article on shareware and welcome the opportunity to mention my educational shareware Algebrax. It is an algebra tutorial for many different types of users. I have received thank-yous from children using it and from parents using it in junior colleges. Interested readers can download Algebrax from many BBSes or order it from one of the many shareware companies that list it.

PROF. WEISMAN
Staten Island, N.Y.

Eureka, That's It!

I HAVE BEEN totally frustrated since I got my new system in December, started running Desqview, and changed communica- ►

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tions programs. The only on-line work I've been doing is with our BBS. I used to log on to Knowledge Index frequently but have not been able to since I switched systems in December. I couldn't figure out what was going on, and I was just fit to be tied.

Then, to my great pleasure, while I was lying on the beach and reading your article "Open Up to a New World On Line" (April 1989, page 68), I found the answer:

> "For commercial on-line services, the most common parameter settings are: 7-E-1. If you use the wrong settings, you will see only gibberish on the screen."

I ran back to the house to check my settings. Sure enough—they were 8-N-1. Thanks to you, I'm back in my glory as an information addict hot to trot.

CARY C. HARWIN
Marina Del Ray, Calif.

Thanks, Mr. Harwin. We hope the information helps other frustrated communications addicts, too.

—EDS.

APRIL FOOL'S?

AS AN AMIGA 2000 owner, I was intrigued by the picture and article "Buenos Dias, Amiga" (April 1989, page 23). I congratulate you on an informative article about a unique machine. The picture that accompanies the article, however, is of a Commodore PC, not an Amiga 2000—unless the new AT Bridgeboard your review mentions turns the Amiga into more of a "virtual" AT clone than I had imagined. The issue got to our office April 1, so it fit right in anyway.

PAT FALLON
Snydersville, Pa.

Wish we could say we were just April fooling, but we weren't. We goofed. The computer shown was not the Commodore International Amiga 2000 as mentioned in the caption. It was a PC40-III, an AT compatible sold by the same company.

—EDS. ◆

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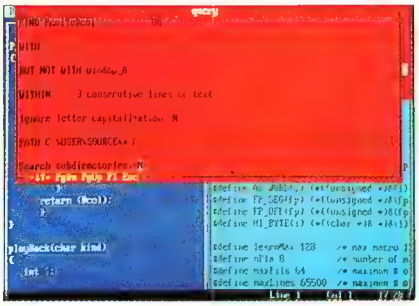

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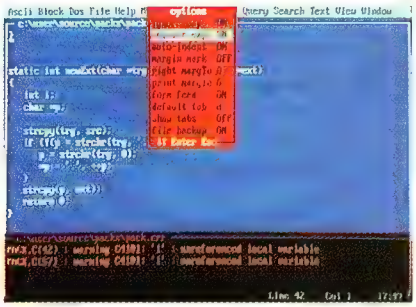

Source and error windows after a compile—the edit options menu is pulled down.

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TIP SHEET

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Anchors Aweigh

I'D LIKE TO pass on a feature of Lotus 1-2-3 that makes defining and editing range addresses easy when you want to change a range's anchor cell in midstream. My technique also works for defining formulas.

When you use the highlighting method to define a range of cells, you select one corner of the range, which becomes the anchor cell, and then use the cursor keys to expand the range from there. The cell you select as you move the cursor, the free cell, becomes the opposite corner of the range. As you tap the cursor keys to expand or contract the highlighted area, the anchor address stays the same, but the free-cell address changes to reflect cursor movement. (You can confirm the addresses of the anchor and free cells by reading the second line of 1-2-3's control panel.)

While highlighting is efficient, you can easily make mistakes when using it. Suppose, for example, that you set the anchor at C5, highlight the range down and right to cell E11, and then realize you should have included rows 3 and 4 in your range. If you move the free cell up to include rows 3 and 4, you lose rows 6 through 11. Here's the trick. If you press the period key, the free cell becomes the anchor cell, and vice versa. If you make the switch while the free cell is at E11, it becomes the anchor cell. You can then expand the other corner at C5 up to C3 to include rows 3 and 4. Repeatedly pressing the period key alternates the positions of the free and anchor cells.

ELIZABETH A. SIMCOX
Columbus, Ohio

Listings Fix

MY EPSON FX 85/185 printer put me in a position to catch an error in LLIST.BAS (see "Professional Listings," Program Listing 3, April 1989, page 16), a short program that lets Epson-compatible printers print better-looking Basic listings. To eliminate the problem, replace:

E$;"B";CHR$(15)

with

CHR$(15)

(For future reference, also change the Table. The code for producing condensed type on an Epson printer is incorrect.)

I liked this corrected version of LLIST.BAS enough to modify it to print any ASCII text file in condensed mode. My program, CONDENSE.BAS (see Program Listing 1), works with IBM- or Epson-compatible printers set for IBM mode. If your printer doesn't have an IBM mode, you must substitute the proper codes.

C. THOMAS HOGG
Louisville, Ky.

PROGRAM LISTING 1. CONDENSE.BAS is a Basic program that prints neater-looking listings of programs or text files saved in ASCII format. The program, which works on IBM- and Epson-compatible printers (in IBM mode), prints programs or text in condensed type and skips perforations.

```
10  KEY OFF:CLS:LINE INPUT "Basic File Name (with extension) ";F$
20  WIDTH "LPT1:",132:E$=CHR$(27)
25  REM ---------------- Set Compressed Pitch (17.16 Char/Inch)
30  LPRINT CHR$(15);
35  REM ---------------- Set to skip 5 lines over the perforation
40  LPRINT E$;"N";CHR$(5);
45  REM ---------------- Set left margin to 10, right margin 122
50  LPRINT E$;"k";CHR$(10);CHR$(122);
60  OPEN "I",1,F$
70  IF EOF(1) THEN CLOSE:LPRINT CHR$(12):SYSTEM
80  LINE INPUT #1,F$
90  LPRINT F$
100 GOTO 70
```

End

Lotus to Dbase

MY RECENT EXPERIENCE converting a large Lotus 1-2-3 spreadsheet into a Dbase III+ database taught me a few things about Dbase III+. After performing the conversion with Dbase's APPEND FROM command, I noticed that I'd lost a few spreadsheet cells. By experimenting, I discovered that unless cells at the beginning or end of a row contain some form of data, Dbase loses them during conversion. Unfortunately, most spreadsheets include empty cells. My solution was to fill each empty cell at the beginning or end of a row with a space character. The cells look blank, but they survive the conversion.

BILL SCHOOLER
Virginia Beach, Va.

Word Macros Update

IN THE APRIL 1989 issue, you presented a tip by Frank Giffen on using Microsoft Word 4.0 macros to print keystroke definitions (see "Word 4.0 Macros," page 14). He had trouble using the glossary to print the phrase:

<Enter>

which Word's macro language reads as a carriage return.

Mr. Giffen solved the problem by misspelling the word and then correcting it:

<Ente><left 1>r<right>

You can more easily accomplish the same end by using the caret (^) as an escape ►

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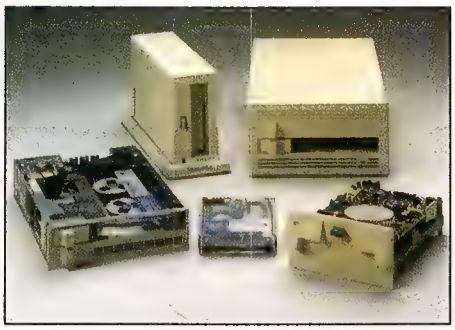

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character. Whenever it encounters a caret, Word's macro language prints the character that follows without interpreting it (the less-than symbol, in this case).

To define a glossary entry as <Enter>, for example, you would use:

^<Enter>

To follow this entry with a real carriage return, type:

^<Enter><Enter>

This technique lets you make glossary entries such as:

^<F3>

To print a caret from the glossary, you must use two of them. To print the sequence ^C, for instance, create the glossary entry:

^^C

RICHARD W. BEEBE II
Hamden, Conn.

BOOT OPTIONS

I SOMETIMES HAVE to change my CONFIG.SYS and AUTOEXEC.BAT files to make the best use of my system's 640K of RAM. For instance, certain large programs require that I reduce the size of my RAM disk or remove a memory-resident program. Although I usually change these setups only once or twice a month, I like to have the new ones readily available. That way, I don't have to look up command syntax, edit CONFIG.SYS and AUTOEXEC.BAT, and then restore them to their usual form.

I keep copies of my versions of these DOS startup files in the root directory of my boot disk and give them extensions that describe their functions. CONFIG.STD, for example, holds a copy of my standard CONFIG.SYS file. CONFIG.180 loads a 180K RAM disk, and CONFIG.360 loads a 360K RAM disk.

When I want to install the large RAM disk, I type the following command to overwrite my standard CONFIG.SYS with the large RAM disk version:

COPY CONFIG.360 *.SYS

I then press Ctrl-Alt-Del to do a warm boot and install the RAM disk. When I finish, I return to my standard configuration by rebooting after typing the command:

COPY CONFIG.STD *.SYS

I use the same technique with my versions of AUTOEXEC.BAT. If you frequently change both CONFIG.SYS and AUTOEXEC.BAT, you might consider writing a batch file that makes both changes at once.

LEE GRAF
Aurora, Colo.

BATCH-FILE SUBROUTINE

I FOUND AN easy way to create the equivalent of subroutines in batch files. My technique involves calling a sequence of batch-file lines (the subroutine) from different places within a batch file. After the "subroutine" executes, program control returns to the area that called the subroutine. To do this, you must store a return address (a batch-file label) in the environment before the program jumps to the subroutine. The final line of the subroutine uses a GOTO command to return program control to the stored label.

The example batch file, FORMAT4.BAT (see Program Listing 2), shows how you might use this trick to format several floppy disks. It's part of a larger batch file I use to back up files on my hard drive.

FORMAT4.BAT defines the environment variable P1 and uses it to hold the return label. (Note that when you use an environment variable in a batch file, you must enclose it in percent signs.) When the batch file ends, it removes P1 from the environment by defining it as nothing.

COLIN R. SLEDGE
Dallas, Texas

PROGRAM LISTING 2. FORMAT4.BAT demonstrates how to create a subroutine within a batch file. The program formats four floppy disks, two at a time.

```
ECHO OFF
CLS
ECHO You will need four disks for this procedure.
SET P1=MD1
GOTO FORMAT
:MD1
LABEL A: BACKUPØ1
LABEL B: BACKUPØ2
SET P1=MD2
GOTO FORMAT
:MD2
LABEL A: BACKUPØ3
LABEL B: BACKUPØ4
ECHO This procedure is finished.
GOTO FINISH
:FORMAT
ECHO Insert floppies into drives A and B.
PAUSE
FORMAT A:
FORMAT B:
GOTO %P1%
:FINISH
SET P1=
```

End

WORD PERFECT 5.0 AND GRAMMATIK II

AFTER UPGRADING TO Word Perfect 5.0, I found that it doesn't work with Grammatik II 1.26, and you can't customize Grammatik II to make the two compatible. To learn where a document falls on the Flesch scale of readability, I have Word Perfect 5.0 convert the file to the Word Perfect 4.2 format, with which Grammatik II works fine.

The proper procedure is to bring the file into Word Perfect, call up the Text In/Out menu (Ctrl-F5), select option 4 from the menu to save in Word Perfect 4.2 format, and exit Word Perfect without saving (F7). Be sure you exit *without* saving; otherwise, Word Perfect converts the file back to the 5.0 format. After running the file through Grammatik II, you can convert it back into the 5.0 format just by bringing the file into Word Perfect 5.0.

BEV CONOVER
Sparta, N.J. ◆

TECHNICAL EDITOR *David Rowell is always eager to hear about tips you want to share on any aspect of MS-DOS computing. Send a typewritten discussion of your techniques, as well as daytime and evening phone numbers, to* PC Resource, *80 Elm St., Peterborough, NH 03458. If we publish your tip, we will send you a* PC Resource *T-shirt, so be sure to mention your T-shirt size, too. Program listings must be submitted on a 5¼-inch disk along with an ASCII text file that explains how they work. Listings should be no longer than 25 lines. Unfortunately, we cannot return or acknowledge Tip Sheet submissions.*

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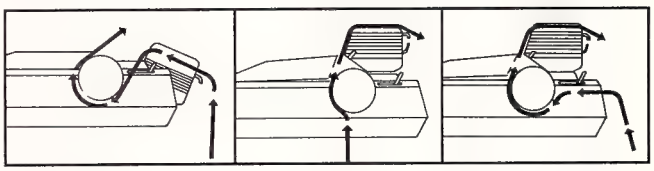

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PC Magazine, May 30, 1989

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PC Magazine, May 30, 1989

In the May 30th issue PC Magazine reviewed 104 machines from 58 manufacturers. Virtually every '386 in production was tested. The systems were grouped into three speed categories, 16, 20 and 25MHz. In two of the three categories *only one* company was selected for "overall excellence." That company is ZEOS.

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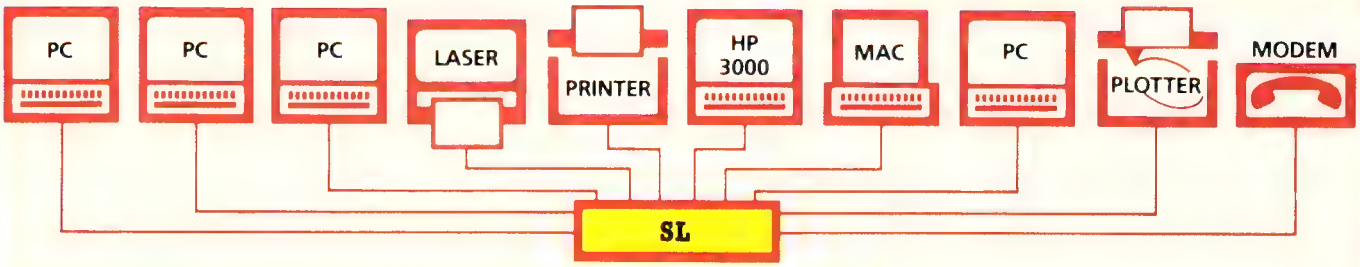

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POCKET COMPUTERS: NOT JUST A NOVELTY

EVER SINCE RADIO SHACK's 4-pound TRS-80 Model 100 whetted the public's appetite for a true notebook-size computer, most portables have seemed like props in *The Incredible Shrinking Man*—too bulky and heavy to be considered truly portable.

Relief from dislocated elbows is on the way, however. The portable/laptop industry is in the first stages of a miniaturization trend that will result in nearly full-featured, pocket-size computers by the end of this summer. And a wave of notebook computers, led by NEC Home Electronics' Ultralite, could join pocket machines in redefining the concept of portable computing.

Development of smaller, more energy-efficient semiconductor chips, as well as improved techniques for crowding them on a printed circuit board, has hastened the move toward small machines. In addition, ROM and RAM cards have solved the problem of providing fast, portable data storage while adding little to the computer's size and weight. About the size of a credit card, these cards contain transistors that can store preprogrammed code or supplement the computer's built-in RAM.

PIXELS IN YOUR POCKET

Handheld computers have been around for years, but they've been limited to specialized business uses like order entry and inventory tracking. Such computers typically have a non-standard keyboard, less than 128K RAM, and small LCD screens. MS-DOS versions became available only two years ago.

Sharp Electronics Corp. rekindled interest in pocket computers late last year when it introduced the Wizard, a $299 "electronic organizer" with 32K RAM, ROM-card application software, and an optional link to desktop PCs. Because the Wizard is hardwired for scheduling and note taking and has a non-standard keyboard, it can't be considered a full-fledged PC. Still, Sharp Electronics targeted the 6½- by 3½- by ⅞-inch Wizard at computer users, technology buffs, and executives, generating a renewed discussion in the computer industry about the technology's potential.

If the Wizard has disappointed computer users who were hoping for a true pocket computer, two products slated for release this year might provide the needed breakthrough in size and function. This month, Atari Computer plans to offer the Portfolio ($399), a 1-pound, 80C88-based machine that is slightly smaller than a video cassette tape. Running at 4.92MHz, the Portfolio has a 63-key QWERTY keyboard, a 40-character by 8-line LCD screen, and 128K RAM that is expandable to 640K on a small expansion box. It runs a ROM-based clone of MS-DOS 2.11 developed by Distributed Information Processing, a British company. Bundled applications include a basic word processor, a 1-2-3–compatible spreadsheet, and time management utilities; optional ROM cards containing popular software are in the works. The machine can also store phone numbers and dial them for you by sounding the appropriate tones into the receiver. Atari claims the Portfolio's three AA batteries provide 48 hours of uninterrupted use—much longer than the 2–5 hours of the typical laptop.

Within weeks after the Portfolio hits the shelves, Atari Computer should face serious competition from Poqet Computer Corp., a new company founded by former employees of Texas Instruments Inc. The Poqet computer will be approximately the same size and weight as the Portfolio, but it will have several performance advantages. It will have a standard (if long and narrow) 80-character by 25-line LCD screen and a 77-key QWERTY keyboard. It will also run a complete Microsoft version of MS-DOS 3.31, compared with the DOS 2.11 clone of the Portfolio. Like the Portfolio, it will accept ROM cards containing popular software. The battery life "will be longer than anything else on the market," claims Gerry Purdy, Poquet Computer's director of marketing, who adds that the ►

Atari Computer's Portfolio is a PC compatible that weighs less than a pound and fits in a coat pocket.

by DAVID ESSEX

price will be roughly $2,000—five times as expensive as the Portfolio. The company was planning to release further details of the machine last month.

Beyond the Model 100

Poqet Computer officials predict that the market for lightweight portable computers will segment into two distinct categories: pocket and notebook. NEC Home Electronics' $2,999 Ultralite, introduced last October, is the leader in a new generation of notebook machines.

The 4.4-pound Ultralite is more powerful than the Portfolio and Poqet computers. It comes standard with 640K RAM and a 2,400-bps modem and has a 1MB RAM disk that serves as drive C. The LCD screen is lit from behind, making it brighter than the Portfolio screen. The system's permanent ROM contains DOS 3.3, a DOS shell, and Traveling Software's Laplink communications program. Optional ROM cards provide such software as 1-2-3 Release 2.01, Word Perfect 5.0, and Xywrite III.

Not to be outdone by its archrival in the laptop industry, Zenith Data Systems is expected to introduce a notebook computer this month. The machine is believed to weigh less than 7 pounds and have a full complement of standard I/O ports. (Generally, the other pocket and notebook machines offer only standard floppy drives as options and have incomplete, non-standard, or optional I/O setups.) It supposedly uses a new 2-inch floppy medium for backing up data. Although the exact price was unavailable at press time, Zenith Data Systems says the computer will cost less than the Ultralite.

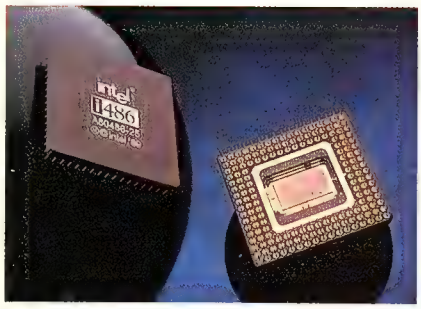
The new computers' lack of standard disk storage is perhaps their most serious handicap, but it may turn out to be their biggest asset. To get files in and out of the machines, you must have the optional drive or use a cable or a modem-based communications program. To Mark Eppley, president of Traveling Software, communicating from a pocket computer is not a drawback; it's the way people will take advantage of portability in the near future.

Eppley, who has a vested interest in laptop connectivity products—his company was built on them—says pocket computers of the 1990s will transmit data via radio waves. They will be in touch with a huge cellular and satellite network, much like today's cellular phones. Eppley is so serious about his pocket utopia that he is working with prominent manufacturers to develop a Wizard-size pocket computer of his own, the CP-1000, which he says will feature major advances in battery and display technology. The CP-1000 and its competitors could thus fulfill the original promise of portable computing. "It will be the Dick Tracy watch that we've dreamed of," Eppley says.

Speed and Power Reign At Computer Trade Show

PROCESSING POWER TOOK a quantum leap forward at Comdex/Spring '89 in Chicago, the computer industry's second-largest trade show. Intel Corp. introduced the next-generation microprocessor for IBM compatibles, the top speed of 80386-based computers went from 25MHz to 33MHz, optical character recognition (OCR) software multiplied, and color laptop screens appeared in prototype.

INTEL packed an auditorium with journalists and industry luminaries to announce its **80486 CPU**, a mainframe-level chip that will almost certainly form the core of most high-end PCs for years to come. The chip packs 1.2 million transistors, compared with the 275,000 on the 386 chip. The 25MHz version is rated at 15 MIPS (million instructions per second) and the 33MHz version clocks in at 20 MIPS; by comparison, top-of-the-line 386s average about 6 MIPS. The 486 will also be "downward compatible" with the 386, which means it will run software written for the 80386, 80286, and 8088 microprocessors. Increased speed and power will be the immediate results; multitasking, multiuser software that dwarfs today's programs will be the long-term benefit.

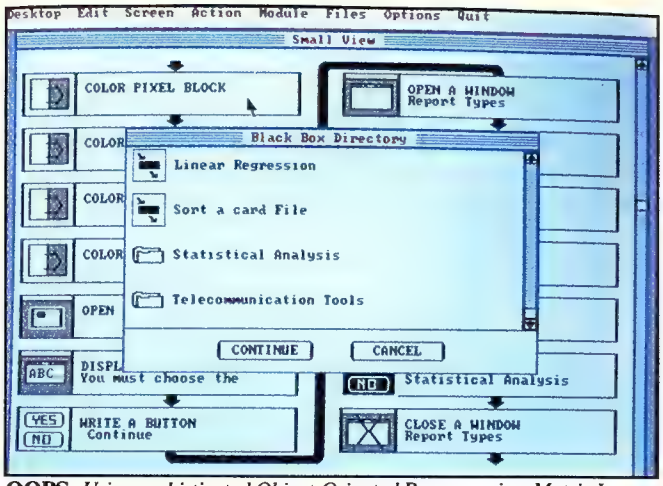


The 80486 microprocessor from Intel will anchor the next generation of IBM compatibles. It has three to four times the processing power of the 80386 chip.

Not surprisingly, top officials from prominent hardware and software companies lined up behind Intel to support the 486. Bill Gates, chairman of Microsoft Corp., said his company is developing an OS/2 upgrade that takes advantage of the 32-bit data path of the 386 and 486. Developers will receive the new OS/2 later this year, according to Gates. AST Research, Compaq Computer Corp., IBM, Olivetti, and Zenith were among the hardware companies promising to make 486-based computers. The machines are expected to cost more than $10,000 and won't be available until 1990, although AST Research and Compaq are reportedly planning for releases this year.

The Intel debutant's ball also featured the introduction of a **LOW-POWER 386SX CHIP**, apparently meant to compete with the low-power 80C286 chips that Intel's competitors have been selling to laptop makers. The result is likely to be a crop of 386SX-based laptops that serve as less expensive entry points to 386 technology as well as competing in price with 286-based laptops. And volume shipments of the long-rumored **33MHz 386** were announced, with more than a dozen manufacturers displaying computers containing the chip. The chip increases the maximum clock speed available in 386 computers by approximately 33 percent. AST Research, Advanced Logic Research, Everex, and Zenith were among the early starters.

OCR SOFTWARE is finally coming into its own, if the number of Comdex exhibitors showing it is any indication. At least 35 companies demonstrated optical scan- ►



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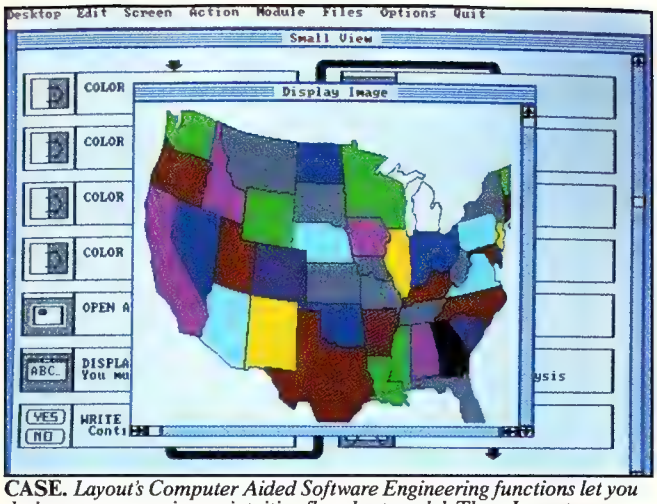

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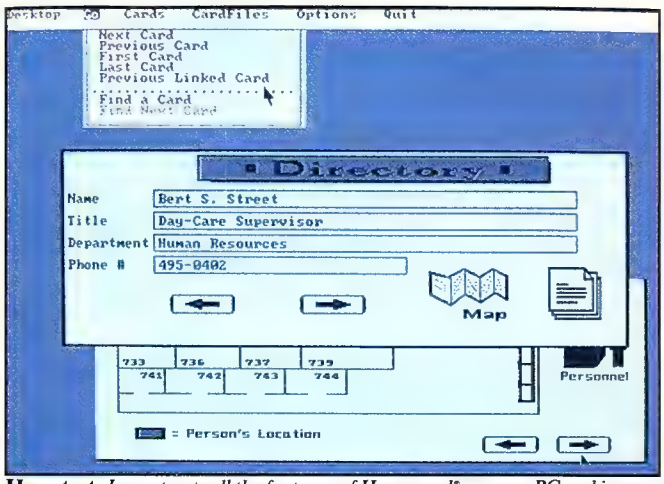

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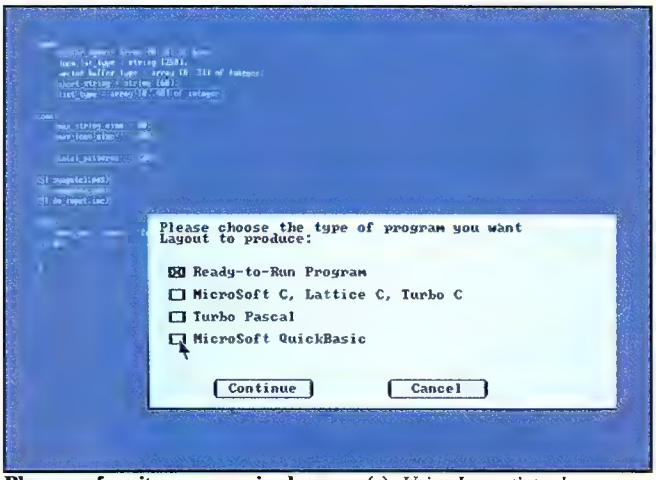

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Circle 701 on Reader Service card.

ners as well as software that can "read" scanned-in letter images and store them in ASCII format. The key trend words were "inexpensive" and "software-only": Some packages dipped below the $1,000 mark for the first time, and OCR boards were nudged toward obsolescence by software/scanner combinations. **CAERE CORP.** in Los Gatos, Calif., introduced a Windows 386 version of Omnipage, its OCR program. Omnipage 2.0 costs $895; the XT/AT package includes a processor board and costs $2,495. Caere claims its product can read nearly any document, including one with mixed typefonts, bold and italic text, and multiple columns.

FLAGSTAFF ENGINEERING in Flagstaff, Ariz., introduced an upgrade of its SPOT OCR Text Reader. Version 3.0 of the program ($995) can recognize more fonts than its predecessors and has context-sensitive help screens.

COLOR LCD SCREENS may soon be coming to portable computers, which have long been cursed with dull, two-toned screens. Gawkers crowded around one corner of the **TOSHIBA AMERICA** booth to look at an experimental color technology that the Japanese company is developing with **IBM**. Employing thin-film transistor (TFT) technology, the flat-panel display contains more than 1.5 million transistors. Each transistor controls a red, green, blue, or white translucent dot to display up to 16 colors.

Toshiba and IBM recently demonstrated a flat-panel, color LCD screen containing 1.5 million transistors that control its display.

Next to the 14-inch diagonal TFT screen was an 11-inch color LCD that apparently uses traditional LCD technology. Toshiba won't specify exactly how it works, nor is the company predicting when either product will become available.

Meanwhile, **SHARP ELECTRONICS CORP.** showed a 20MHz 386 laptop with a "double supertwist" color LCD that could beat the Toshiba/IBM product to market. The 14-inch screen is VGA compatible and can display a maximum resolution of 640 by 480 pixels. Sharp says the laptop will be available by the end of 1989 for an undetermined price.

HITACHI AMERICA LTD. continued to exhibit its own TFT prototype, a 6.3-inch, eight-color screen similar to the Toshiba/IBM LCD but with only red, green, and blue color dots. Hitachi says the screen is now being mass produced, making it "the world's largest production-size display of its kind." It should be available by the end of this year, according to the company.

SHORTS

MAXEM CORP. introduced Cause ($495), a "personal programming tool" that joins the burgeoning market for object-oriented programs. Programs will run on both IBM compatibles and the Apple Macintosh without alteration. . . .**STAR SIGNAL INC.** showed Colorfax, a $19,995 computer/scanner/printer/fax combination that produces color facsimiles. . . .**TOSHIBA** claimed its new 8MB memory board is the first to contain 4-megabit memory chips; an October 1989 release date is planned. . . .**IBM** said it is working with Jensen-Jones Inc. to develop a personal information manager.

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UPGRADES

☐ Zsoft Corp. added several major features to **PC PAINTBRUSH**, a graphics program whose .PCX file format has become one of the graphics standards. PC Paintbrush IV uses the Microsoft Windows interface but does not require the Windows operating system to run properly. It has seven new special effects for enhancing an image. Among the features are tint, brightness, contrast, and smudging. Also new are control of type kerning and leading, two features which were formerly available only in the company's more expensive PC Paintbrush Plus and Publisher's Type Foundry. Zsoft plans to release a Windows-like upgrade of PC Paintbrush Plus sometime during the summer; a Publisher's Type Foundry upgrade will follow later. PC Paintbrush IV sells for $99.95; owners of earlier versions may upgrade for $35. Zsoft Corp., 450 Franklin Road, Suite 100, Marietta, GA 30067, 404-428-0008.

☐ Lotus 1-2-3 and Symphony users who create graphs of their spreadsheets with Intex Solutions' **2-D GRAPHICS** can now add more detailed information to their visual presentations. **VERSION 1.01** of this 1-2-3 and Symphony graphics add-in lets you display a legend up to 12 lines long and 99 characters wide at the bottom of the graph. The log-scale display now reproduces the look of real log-graph paper, and the scales use whole numbers instead of fractions. You can manually scale bar graphs and mix line graphs with Hi-Lo-Open-Close graphs. 2-D Graphics 1.01 sells for $145; current owners can upgrade for $25. Contact Intex Solutions Inc., 161 Highland Ave., Needham, MA 02194, 617-449-6222.

BARGAINS

☐ From now until Dec. 31, 1989, when you buy a desktop or laptop Samsung computer, you're entitled to a **FREE PROGRAM** from Borland International. Under the companies' joint promotion, Borland will offer a selection of four programs worth from $149.95 to $247.50. The programs are Quattro 1.0, a graphics spreadsheet program; Sprint: The Professional Word Processor; Reflex 1.0, a flat-file database; and Sidekick Plus 1.0, a desktop manager. The joint promotion also offers Samsung customers Borland's Paradox 2.0, a relational database, for $150 (regularly $495). Contact Borland International, 1800 Green Hills Road, Scotts Valley, CA 95066, 408-438-8400.

☐ Acer Technologies Corp. has launched a **"JUST FIX IT" GUARANTEED REPAIR** service program, promising to repair its customers' equipment by the next business day. To qualify, you must purchase an Acer computer from an authorized reseller and return the warranty information with proof of purchase to Acer within 10 days. The "Just Fix It" guarantee covers the first four months of ownership; for $99 you can extend the service contract for a year. Contact Acer Technologies Corp., 401 Charcot Ave., San Jose, CA 95131, 408-922-0333. ◆

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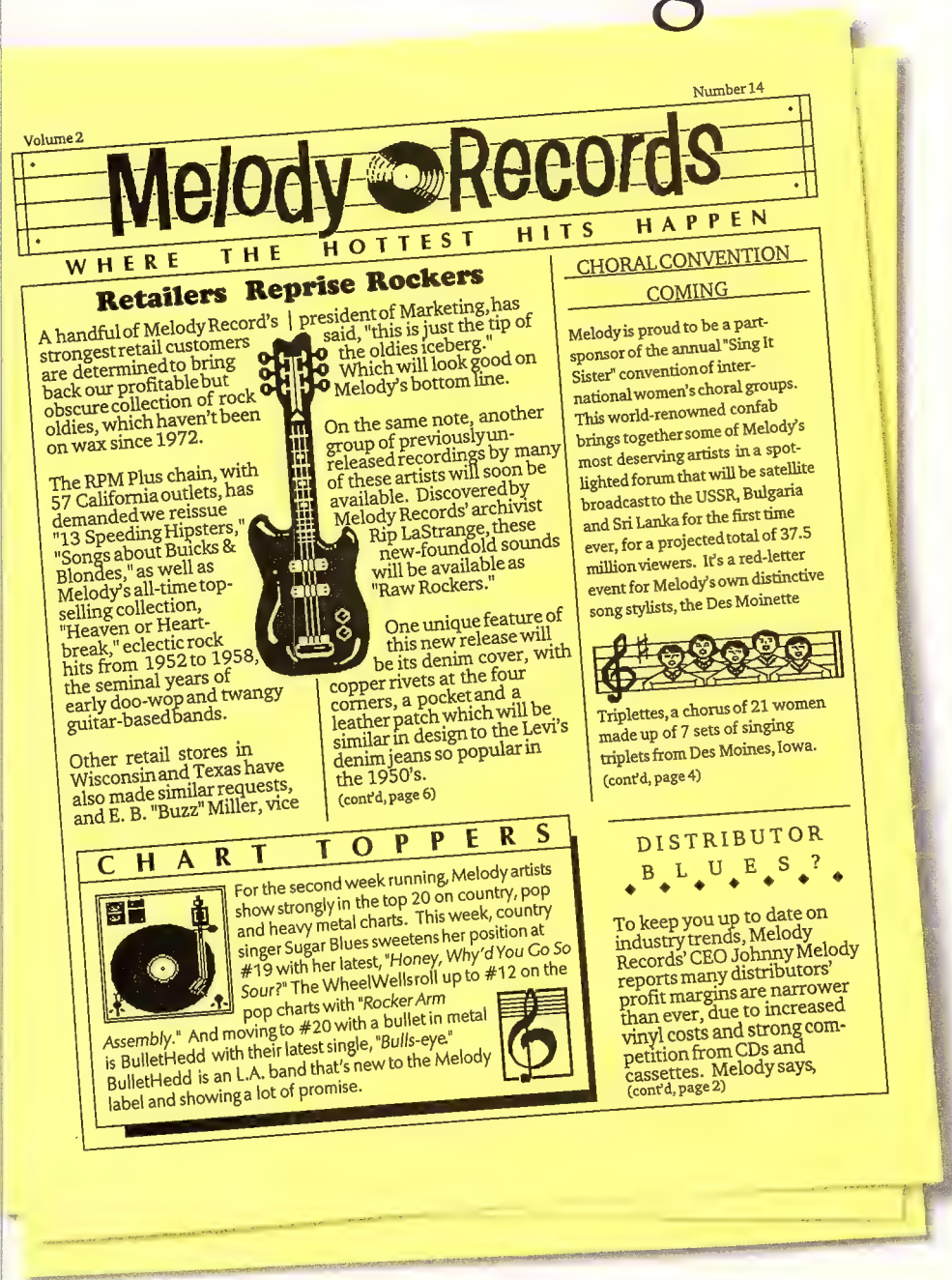

Volume 2 — Number 14

Melody Records

WHERE THE HOTTEST HITS HAPPEN

Retailers Reprise Rockers

A handful of Melody Record's strongest retail customers are determined to bring back our profitable but obscure collection of rock oldies, which haven't been on wax since 1972.

The RPM Plus chain, with 57 California outlets, has demanded we reissue "13 Speeding Hipsters," "Songs about Buicks & Blondes," as well as Melody's all-time top-selling collection, "Heaven or Heart-break," eclectic rock hits from 1952 to 1958, the seminal years of early doo-wop and twangy guitar-based bands.

Other retail stores in Wisconsin and Texas have also made similar requests, and E. B. "Buzz" Miller, vice president of Marketing, has said, "this is just the tip of the oldies iceberg." Which will look good on Melody's bottom line.

On the same note, another group of previously un-released recordings by many of these artists will soon be available. Discovered by Melody Records' archivist Rip LaStrange, these new-found old sounds will be available as "Raw Rockers."

One unique feature of this new release will be its denim cover, with copper rivets at the four corners, a pocket and a leather patch which will be similar in design to the Levi's denim jeans so popular in the 1950's.

(cont'd, page 6)

CHORAL CONVENTION COMING

Melody is proud to be a part-sponsor of the annual "Sing It Sister" convention of inter-national women's choral groups. This world-renowned confab brings together some of Melody's most deserving artists in a spot-lighted forum that will be satellite broadcast to the USSR, Bulgaria and Sri Lanka for the first time ever, for a projected total of 37.5 million viewers. It's a red-letter event for Melody's own distinctive song stylists, the Des Moinette Triplettes, a chorus of 21 women made up of 7 sets of singing triplets from Des Moines, Iowa.

(cont'd, page 4)

CHART TOPPERS

For the second week running, Melody artists show strongly in the top 20 on country, pop and heavy metal charts. This week, country singer Sugar Blues sweetens her position at #19 with her latest, *"Honey, Why'd You Go So Sour?"* The WheelWells roll up to #12 on the pop charts with *"Rocker Arm Assembly."* And moving to #20 with a bullet in metal is BulletHedd with their latest single, *"Bulls-eye."* BulletHedd is an L.A. band that's new to the Melody label and showing a lot of promise.

DISTRIBUTOR BLUES?

To keep you up to date on industry trends, Melody Records' CEO Johnny Melody reports many distributors' profit margins are narrower than ever, due to increased vinyl costs and strong com-petition from CDs and cassettes. Melody says,

(cont'd, page 2)

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Is Disk Doctoring Worth the Risk?

IT HAS THE makings of an underground revolution. Cost-conscious computerists are rebelling against the high price of 1.44MB 3½-inch disks and devising ways to coax more mileage from cheaper 720K disks. For some, the task is an easy one. Terry Terfinko of Emmaus, Pa., for example, convinced his IBM PS/2 floppy drive to format a standard 720K disk to hold 1.44MB of data by simply inserting the disk and typing:

FORMAT A:

Others—Tandy 3000 NL owner Gary Richardson of Danville, Va., among them—fool their high-density floppy drives by drilling a small media-sensing hole near the lower right edge of a 720K disk. This opening is the distinguishing mark that identifies high-capacity disks. Most high-density drives check for the hole; if it's there, the drive happily formats the disk to hold 1.44MB of data.

My mail indicates that most people who have punched holes in their 720K disks have so far had no problems with their overstuffed disks. Word of their success is spreading. Inevitably, the relative ease with which you can alter a 720K disk has lead some computer users to accuse disk manufacturers of ripping off consumers. But not everyone is so convinced that a conspiracy is afoot. I've also heard from readers who want to know whether it's safe to jump on the bandwagon.

To get to the bottom of things, I conducted a round of unscientific hole punchings on 15 720K disks from a variety of manufacturers. When I used the high-capacity drive in a Zenith Z-286 to format the disks to hold 1.44MB, all but one of the disks formatted correctly the first time. Clearly, the technique works.

But is the data that you store on these disks secure? Disk manufacturers say *no*. They frown on hole punching, first of all, because drilling a hole in the disk case voids the manufacturer's warranty. But more important, they believe that it's unwise because the plastic residue you leave behind after drilling a hole in the case can destroy the disk's internal dust liner, scratch its surface (good-bye data), and even destroy your drive's read/write heads.

Even if you're a careful excavator (one creative soul used the 600-degree tip of a soldering iron to create the sensing hole), you risk losing your data over the long term. Although the two types of disks have the same number of tracks (135 per inch), they aren't manufactured to meet the same reliability standards. A 720K disk must reliably store 8,700 bits per inch (bpi), while a 1.44MB disk is certified to hold 17,500 bpi.

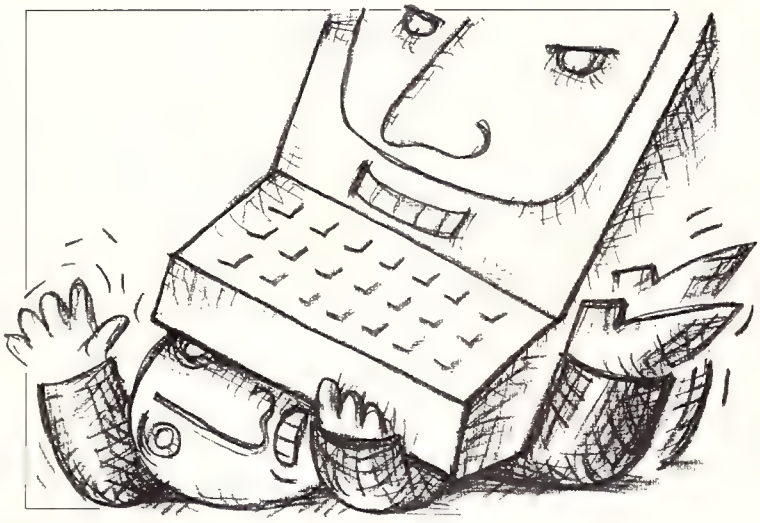
Disk manufacturers claim that more rigorous testing procedures account for some of the extra expense of high-density disks. Another contributing factor is the higher grade of cobalt-enhanced iron-oxide particles used in their surface layer. This coating allows the disk to hold more data bits per inch. It also ensures that densely packed information won't vanish over time.

I consider these to be very convincing arguments. Although I cringe at paying $8 or $9 for a floppy disk, I would much rather pay more and not have to worry about having my data pull a disappearing act.

DOS

LASTDRIVE Outta Town

I HAVE A *Kaypro 16 computer running under MS-DOS 2.10. When I insert* ►



by JOHN WOLFSKILL

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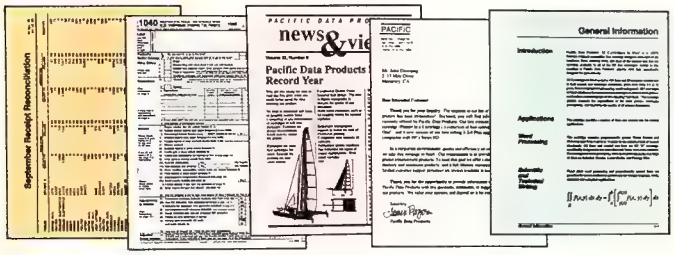

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Circle 410 on Reader Service card.

the following line:

LASTDRIVE = Z

in my CONFIG.SYS file, I receive an "Unrecognized command in CONFIG.SYS" error message. Can you tell me how to fix this problem?

JEFF D. PARRISH
Zion, Ill.

THE SOLUTION TO your problem is simple, but it will cost you money. You need to upgrade to a later version of MS-DOS. The LASTDRIVE command, which makes it possible to use the SUBST command to assign fictitious drive letters to subdirectories, is available only on MS-DOS 3.0 and later. The command also extends the maximum number of logical devices from five (A–E) to 26 (A–Z).

NO REPLACEMENT

I USE A *RAM disk for many of my computing sessions. Before I shut off my computer, I want to copy updated versions of old programs or newly created programs back to my hard drive. I've tried using the DOS REPLACE command with the /A option, but it doesn't work. Why not?*

MARK HALL
Rahway, N.J.

IT SOUNDS AS if you've got half of the problem licked. The /A (add) switch tells REPLACE to copy only those files on the source drive (your RAM disk) that don't exist on the destination drive (your hard drive). So, it should transfer any new files you've created. To update the old files on your hard drive, use the /D (date) switch to tell REPLACE to copy only those RAM disk files with later creation dates than similarly named files on your hard drive.

Unfortunately, you can't use the /A and /D switches in the same command. However, you can write a two-line batch file that performs the job relatively quickly. The following batch file, for instance, transfers files from a subdirectory called \SOURCE on drive D to a subdirectory named \DEST on drive C:

```
REPLACE D:\SOURCE\*.* C:\DEST /A
REPLACE D:\SOURCE\*.* C:\DEST /D
```

If you haven't created any new files since the start of your session, DOS displays the message "No files(s) added" when it executes the first line of the batch file. DOS then goes on to execute the second line, copying updated RAM disk files over older hard disk files. (NOTE: The /D switch isn't available with PC-DOS versions of REPLACE.)

BASIC

QUICK BASIC vs. OS/2

WHAT EFFECT WILL *OS/2 will have on those of us who use Microsoft Quick Basic to write programs? Will we have to learn all about OS/2 and multitasking if we want to write simple compiled Basic programs? Will we need to run those programs in OS/2's DOS-compatibility box?*

CURT SWARTZWELDER
Seoul, Korea

YOU DON'T NEED to learn the mechanics of OS/2 or adjust to the vagaries of multitasking to write compiled Basic programs that work with OS/2. Microsoft's Basic compiler, called Bascom 6.0, lets you create executable programs that run under OS/2 or DOS. (Compiled Basic programs that run under OS/2 can use more than 640K of RAM.) Priced at $295, Bascom 6.0 is marketed as a software developer's toolkit. It includes Quick Basic 4.0, the Bascom compiler, a programmer's editor, and a code debugger. If this sounds a bit too heavy duty, don't worry. Bascom is no more difficult to use than Quick Basic.

HELP WANTED

MARTIN RICHTER (16 Country Club Dr., Manchester, NH 03102) is looking for a software package that will let him include Japanese katakana or hiragana text characters in his overseas correspondence.

CAN YOU HELP Marion V. Glinsman (1540 York Ave., New York, NY 10028) outfit a Columbia PC with a new hard drive? ◆

Send your comments and questions of general interest to Q&A, PC Resource, *80 Elm St., Peterborough, NH 03458. Please include your address and a daytime phone number.*

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What you need to know before you buy.

TOOLBOXES FOR QUICK BASIC USERS

EVERYONE BENEFITS WHEN programs look good and run well. Users get windows, dialog boxes, pop-up menus, and other easy ways to interact with programs. Programmers appreciate the challenge of building these and other features into their programs.

Still, programming is complex, and the hours are long. Sure, you can add color borders and fancy screens to your programs or make the disk interactions faster—if you have an extra month or two to figure out just how to do it. But you may not have that time; your boss wants your promised inventory report now, before the company gets swallowed up in some inexorable, hostile takeover. Not to worry: Today's Basic programmers have at their disposal software toolboxes full of ready-made routines to cut the time it takes to make their Basic programs prettier and more efficient.

WHAT'S INSIDE THOSE TOOLBOXES

Toolboxes like ProBas, Db/Lib, and the Exim Toolkit let both amateur and professional programmers create programs more quickly while providing features that they might not otherwise have the time or inclination to add themselves. Toolboxes contain libraries of prewritten software routines, similar to the templates you can buy for your favorite spreadsheet, that attach to an existing program and run just like any routine written by the programmer.

The routines provide functions that the Basic language doesn't have, such as manipulating disk drive directories or mouse support, or they furnish commonly used but tedious-to-program features that most application programs need. In fact, automating commonplace programming tasks like building dialog boxes that ask for user input or writing error-trapping routines are perfect uses for toolbox software. Many toolboxes also provide routines designed primarily to improve the performance of Basic programs.

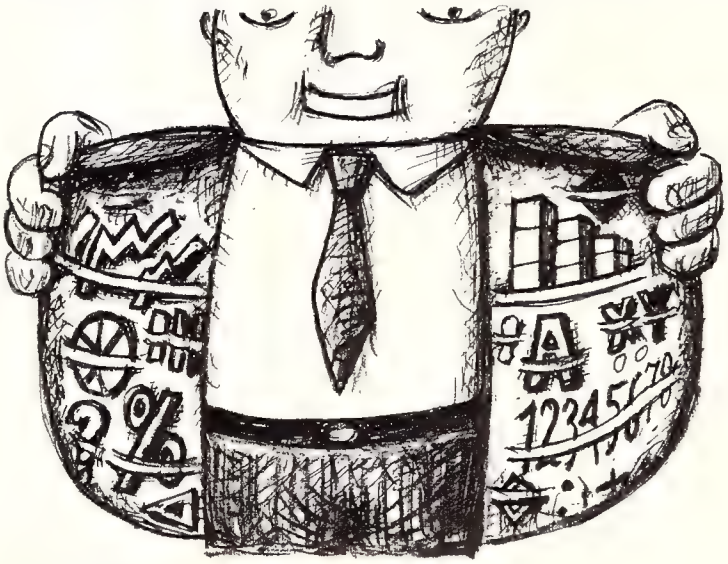
Programmers access the routines stored in a library by using Basic's CALL statement followed by the name of the routine. The CALLing operation usually requires passing some data, often in program variables, to the routine; this process is known as *passing parameters*.

Calling these prewritten routines is possible because modern Basic *compilers*, like Microsoft Quick Basic, work differently from Basic *interpreters*, like IBM's BasicA. Today's compilers generate an intermediate version of a program called an *object file*. Programmers can merge together object files using a software (DOS) utility called a *linker*. These linked object files become one single *executable file* after the linker sets up connections between them. This executable file is the program that a user runs from his or her command line. A *library* is simply a collection of object files; each object file contains one or more routines that implement individual library functions.

Sometimes using software toolboxes requires a programmer to have some knowledge of the workings of DOS's linker utility and a library manager (included in Quick Basic). But frequently, the toolboxes provide batch files that automate the process of linking their libraries to your programs.

MAKING BETTER PROGRAMS

Basic toolboxes fall into broad categories that change as the hardware landscape and the nature of Basic evolve. The earliest of these categories featured speed-up routines, usually written in assembly language, to make the sluggish Basic language perform critical functions faster. ►



by G. MICHAEL VOSE

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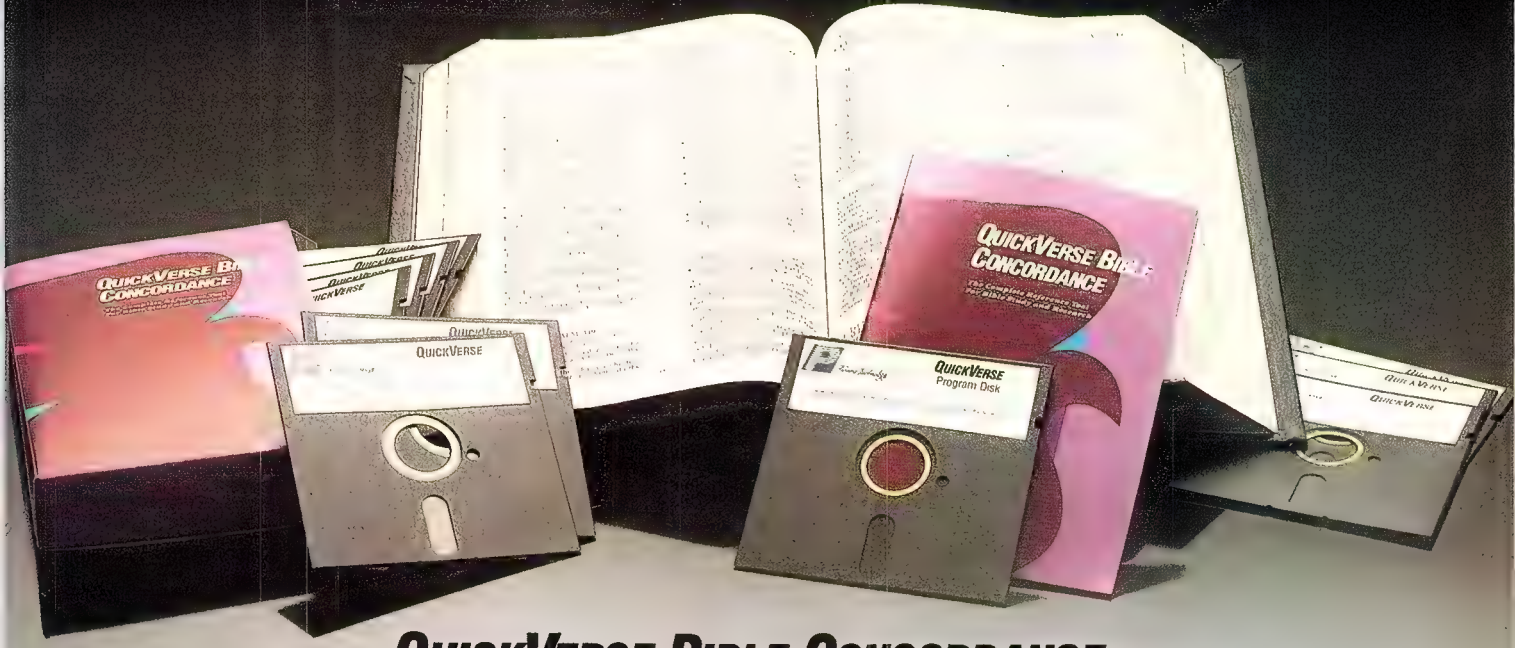

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IBM version requires IBM, Tandy or compatible computer with 256k or more memory, two floppy disk drives or floppy disk drive and hard disk drive, and DOS Release 2.0 or later. (A hard disk drive is recommended but is not required.)

Macintosh version requires 512k or more memory and works with any disk drive configuration.

Circle 264 on Reader Service card.

A little later, libraries of routines to build database software appeared. These routines gave the Basic programmer prewritten support of sophisticated file structures like B-trees, an organizational technique for creating indexes that made for faster and easier retrieval of stored data. They also usually offered routines to build screens for data entry. Today, Basic programmers can build complex, even relational, databases with the more advanced database management libraries available; many of the routines are also compatible with popular database programs like Dbase II and III from Ashton-Tate.

After the arrival of the Macintosh in 1984, libraries of windowing routines appeared that added windows, pop-up menus, and dialog boxes to programs for the PC. New graphics toolkits let programmers add more sophisticated graphics capabilities to their programs. In addition, the advent of the PC/AT and compatible class of computers with their larger memories brought about Basic toolkits that gave programmers a ready-made way of using extended memory, as well as CGA, EGA, and VGA boards and monitors. Today you can even buy toolkits with "canned" communications routines for fax and modem use.

To give you an idea of the kinds of libraries available, I've looked at several prominent packages; my brief impressions of each follow. While some offer a one-stop solution for doing nearly all the tasks mentioned above, others are more specialized. All the packages work with Microsoft Quick Basic.

PROBAS PROFESSIONAL BASIC PROGRAMMING LIBRARY by Hammerly Computer Services contains 368 routines, 29 of which are written in Basic, and the rest in assembly language. If you long to produce snappy-looking programs that perform extremely well, the ProBas Library can give you that ability. The package offers routines to use expanded memory, store strings efficiently in integer arrays, read a 30,000-byte file in 1/18th of a second, or cover the screen with colorful windows. ProBas lets you build virtual screens in memory and then, using in-memory block transfers, display those virtual screens instantaneously. A full range of graphics routines support high-speed, flicker-free CGA, EGA, and VGA programming.

Hammerly Computer Services also offers several toolkits that perform special tasks: ProScreen, for example, lets you design interactive data input screens and then save them for use in a program. The ProBas Toolkit provides modules containing full-fledged operations that a programmer would otherwise have to construct from individual ProBas Library routines; these modules include menu generators, calendar-display subprograms, and a mini-editor that runs in its own window.

A recent addition to the ProBas line is ProRef, an on-line help system for ProBas's 368 library routines. It also lets you create your own memory-resident programs.

All of the ProBas products require 384K RAM and MS-DOS 2.0 or later. Suggested retail prices are Library ($135), Toolkit ($99), ProScreen ($99), and ProRef ($50). Contact Hammerly Computer Services, 9309 Jasmine Court, Laurel, MD 20707, 301-725-4447 or 800-343-7484.

EXIM TOOLKIT has 100-plus routines that manage memory, screens, file I/O, databases, windows, and DOS. For an extra cost, Exim provides a Networks toolkit that lets you write programs for local area networks using the NETBIOS interface.

All of Exim Toolkit's function names start with the letters *xm*—xmdate, xmabort, xmstrcopy—making it easy to find all the Exim routines you embed in your programs. But I find the numerous *xm* characters make my code harder to read. Most of the routines require a large number of parameters, adding further to the clutter of the code.

The Exim Toolkit's manual assumes a high level of programming knowledge; this is unquestionably a product for professional programmers. Exim also provides a product called Genesis-IAA, which provides a shell that lets programmers construct fill-in-the-forms-based applications using a predefined structure; it uses the functions in the Exim Toolkit.

Exim Toolkit requires 384K RAM and MS-DOS 2.0 or later. Suggested retail price is $99.95. Contact Exim Services, P.O. Box 5417, Clinton, NJ 08809, 201-735-7640.

STERLING CASTLE BASIC DEVELOPMENT TOOLS, also called the **BLACKSTAR BASIC DEVELOPMENT TOOLS (BDT)**, takes a slightly different approach to beefing up Basic. Its four components—the Screen Builder System, the B+Tree Data Manager, the EZ Screen Pop-Up Window Manager, and the Help Message System—are separate programs that perform different functions. The programs generate Basic code that you can then append to your existing program. The advantage of this code is that it also works with Basic interpreters like BasicA or GW-Basic.

BDT does not require you to remember the names of specific routines and the parameters that you pass to them. Unfortunately, the trade-off for this strategy is a sacrifice in control; you must take what the BDT tools give you, although you can modify the source code they produce if you're up to it. If you plan to make substantial modifications, working with a flexible library of routines is a better approach.

Basic Development Tools requires 384K RAM and MS-DOS 2.0 or later. Suggested retail price is $99. Contact Sterling Castle Software, 702 Washington St., Marina del Rey, CA 90292, 800-722-7853 or 800-323-6406 (in California).

DB/LIB is strictly a database management toolkit. It provides both object-module level file-access routines written in assembly language and a set of Basic subprograms to perform traditional database management system (DBMS) tasks like browsing, editing, listing and printing records, or reindexing a database.

The DBMS programs you create using a combination of Basic and Db/Lib routines can read and write data files in a format compatible with Dbase II, III, and III+. This product also offers a version for working with networks. Db/Lib works only with Microsoft Quick Basic.

Db/Lib requires 320K RAM (384K RAM for the network version) and MS-DOS 2.0 or later. Suggested retail prices are $139 for the single-user version; $575 for the network version. Contact AJS Publishing, P.O. Box 83220, Los Angeles, CA 90083, 800-992-3383 or 213-215-9145 (in California).

The **MICROHELP QB/PRO** series offers four volumes of routines. Two provide performance-enhancing routines. The other two offer support for concurrent processing, letting you add print spooler-type modules to your programs and a "supershell" to create memory-resident programs. Microhelp is so certain that its library routines will speed up your Basic programs that it includes a benchmark program on the distribution disk, which lets you verify its claims; the manual contains a Speed ►

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Index rating for many of the QB/Pro routines.

The Microhelp manuals provide excellent reference information about using the products; however, the QB/Pro manuals offer no tutorials explaining why to use a given routine. This product assumes a substantial knowledge of programming.

Microhelp Toolbox is a compilation of Basic subprograms and functions offered in both Basic source code form and as object files in a library. The 120-plus routines include input, display, sound, string, and Btrieve subprograms, as well as a variety of functions for date manipulation and arithmetic, bit manipulation, and other operations. By existing as Basic subprograms instead of assembly language routines, they execute more slowly than similar QB/Pro routines but are modifiable. Microhelp also offers a library of speed-up routines called Mach-2. Even if you use only a fraction of Microhelp Toolbox's routines, its cost is justified by the efficient, nice-looking programs it produces.

Both QB/Pro and the Microhelp Toolbox require 384K RAM and MS-DOS 2.0 or later. Suggested retail prices are $99 for QB/Pro and $79 for Microhelp Toolbox. Contact Microhelp Inc., 4636 Huntridge Drive, Roswell GA 30075, 404-552-0565 or 800-922-3383.

QUICK WINDOWS ADVANCED features tools designed expressly for the creation and manipulation of windows. You can control the style, color, size, and fonts used with those windows and build pop-up and pull-down menus, list and dialog boxes (with or without *radio buttons*, or option selection buttons, that you activate by selecting with a mouse or a keyboard), and data-entry windows with entry validation. Quick Windows Advanced automatically saves the contents of the original screen when it opens a window and restores that screen when the window is closed, and its 90-plus functions work with either a keyboard or a mouse.

Some of Quick Windows' routines require fairly long lists of parameters; you'll need to keep the manual close at hand and document your programs carefully to handle this complexity.

Quick Windows Advanced requires 512K RAM and MS-DOS 2.0 or later. Suggested retail price is $139. Contact Software Interphase Inc., 5 Bradley St., Providence, RI 02908, 401-274-5465.

XGRAF GRAPHICS KERNEL LIBRARY provides a variety of routines to enhance or replace existing Basic graphics functions. There is a zoom in/out routine that can enlarge a screen image up to eight times; another routine will print the contents of the screen display to an HP laser printer. XGraf can deal with CGA, EGA, VGA, and Hercules video adapters and supports screen sizes up to 1,024 by 1,024 pixels. XGraf also does windows.

XGraf requires 384K RAM and MS-DOS 2.0 or later. Suggested retail price is $125. Contact Komputerwerk, 851 Parkview Blvd., Pittsburgh, PA 15215, 800-423-3400. ◆

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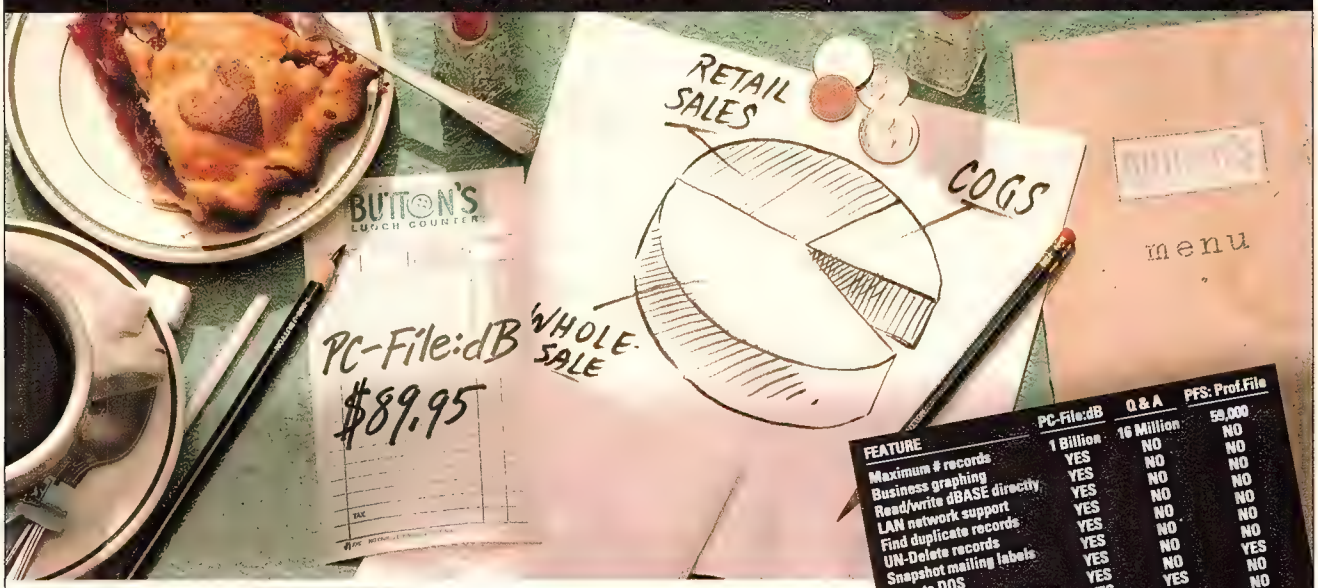

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THE HUB OF THE HOME OFFICE

THE PERFECT COMPUTER for your home office must have enough memory and speed to let you use the latest in business software. But don't forget that when the work is done, the computer can be tapped for family education and entertainment. For that you'll want a display with good text and graphics resolution.

Can one computer do it all at a reasonable price? Yes. This month we look at three 12MHz ATs with hard drives, two with Video Graphics Array (VGA) circuitry and one with Enhanced Graphics Adapter (EGA) circuitry. All provide good text resolution for business applications, and two have color for games and educational software.

Commodore Business Machines Inc., known for its Commodore 64C and Amiga computers, makes a serious assault on the business PC market with its PC40-III, a powerful, high-performance machine with special features and flexibility built into its integrated motherboard. In addition to serial, parallel, and mouse ports, the system board has VGA circuitry, a floppy drive controller, and circuitry that looks at your expansion hardware and adjusts the machine's settings accordingly. The base unit comes with a 40MB 19-ms hard drive, a 1.2MB floppy drive, MS-DOS, and GW-Basic for $2,395. Since Commodore doesn't yet offer a VGA color display, we settled for a monochrome VGA display for a total review unit price to $2,595.

Dataworld Inc., a mail-order company operating since 1983, assembles systems with brand-name components at competitive prices. For $1,195, the Data-286 base model comes with 1MB of RAM, a Hercules-compatible monochrome graphics adapter, and a 12-inch monochrome Samsung monitor. We added a 44MB 25-ms Toshiba hard drive, a 1.2MB TEAC floppy drive, and a VGA adapter card and substituted a 14-inch multiscanning monitor for a total review unit price of $2,759.

Epson America Inc., a leading manufacturer of consumer products, computers (including laptops), and printers, is the U.S. affiliate of Seiko Epson Corp. We reviewed Epson America's Equity II+, a small-footprint AT. Its base model, which comes with a 1.2MB floppy drive, 640K RAM, parallel and serial ports, and MS-DOS 3.3 with GW-Basic, sells for $1,899. Because Epson doesn't offer VGA, we added an EGA video card and monitor to their 40MB 28-ms hard drive system option ($2,999), bringing the total review unit price to $3,897.

We tested each computer in seven categories: keyboard design, display, construction, interior design, documentation, performance, and vendor support. The ratings are based on a 1–5 scale, with 1 unacceptable and 5 superlative. In addition, we rated "extra features," which encompass both hardware and software. A single-star rating indicates that the extra features are a good value, and a two-star rating means superlative value. Star ratings do not affect a machine's summary rating.

KEYBOARD

The PC40-III keyboard lacks heft and a quality feel due to the light-gauge plastic ►

Dataworld Inc. Data-286

Commodore PC40-III

Epson America Equity II+

by M. JARVELA, D. ROWELL, and J. WOLFSKILL

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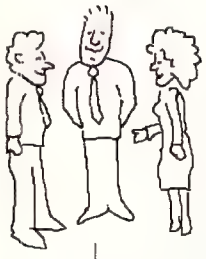

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used in both the shell and keys, but its capacitive key switches produce a fast, light typing action. The key layout follows the standard 101-key enhanced AT pattern.

The Data-286's 101-key enhanced AT keyboard uses mechanical key switches that provide very good overall typing action—slightly brittle, but smooth. Constructed of light-gauge plastic, the keyboard has wide, rubber skid pads and a pair of two-position, non-locking prop feet. The Ctrl and Caps Lock keys can be interchanged by repositioning a slide switch on the bottom of the keyboard. A removable plastic keyboard dust cover is included as standard equipment.

The sturdy Equity II+ keyboard has a 101-key enhanced AT layout, but the brown and blue letters and numbers give it a somewhat different look. Mechanical key switches contribute to the solid typing action. The unit has pop-out feet, but you may not need to use them because the keyboard's concave shape provides a comfortably slanted typing angle. The keyboard's cable connector plugs into a recessed area behind a small door on the front of the computer—a clever setup that keeps the connector from interfering with placement of the keyboard.

RATINGS

	PC40-III	DATA-286	EQUITY II+
Keyboard	3	3	4
Display	4	4	3
Main Unit	3	2	4
Under the Hood	4	3	3
Documentation	4	3	4
Performance	4	4	3
Support	3	3	3
Summary	3.6	3.1	3.4
Extra Features		★	★

Unacceptable 1 Worse than average 2
Works as it should 3 Better than average 4 Superlative 5
*Good value **Superlative value

DISPLAY

Commodore increased the value of the PC40-III by building 16-bit VGA circuitry into a system board with a powerful Paradise video chip and 256K of video RAM. The chip supports VGA, EGA, CGA, MDA, Hercules, and Plantronics video modes. Commodore added total register-level hardware support of MDA, Hercules, and CGA to give you backward compatibility with older video standards that is rare in today's VGA systems. A utility program lets you switch between modes, including 132-column by 25- or 43-line text displays, from the DOS prompt. If you add a second monochrome or CGA card, you can run two monitors at once. The 15-pin video output port on the back requires a VGA or multiscanning monitor; it won't accommodate a TTL display.

Although Commodore's 1403 VGA monochrome monitor won't satisfy users who demand color, its ability to display 64 shades of gray means that the monitor does a good job of interpreting color software. Although its screen isn't particularly flat or glare-free, the 1403 produces text that is clear and readable, though not as crisp as that on a TTL monochrome monitor. The monitor has a tilt-and-swivel base.

The Data-286's video board and monitor make a good team. Manufactured by video specialists Paradise Systems Inc., the 16-bit VGA adapter supports screen modes not available on the original IBM VGA card, including 800- by 600-pixel graphics and 132-column text. Its 640- and 400-pixel resolution graphics mode allows up to 256 colors. The DIP switches used to set video modes are accessible from outside the computer. The 14-inch NEC Multisync multiscanning monitor displays sharp, steady text and bright, accurate colors. A text-mode switch allows you to display text in white, amber, or green, but it only works when you have an EGA or CGA card installed.

The Epson EGA monitor and Paradise EGA video card that we added to the Equity II+ are compatible and produce bright, clear colors in either a 640- by 250-pixel or 640- by 350-pixel resolution graphics mode. A text-mode switch on the front lets you alternate between amber and white letters.

THE MAIN UNIT

Plain but careful design characterizes the sturdy metal PC40-III case. The most notable features of the case are in the rear: labeled ports and a chart of settings for the video configuration switches. You need a ballpoint pen to activate the reset button, which is recessed on the right side of the computer. (Commodore's philosophy is that many people go for the reset button too quickly. If you reset while files are open, you risk disrupting the file allocation table, which can result in data loss.)

The standard, two-tone AT shoebox design of the Data-286 is functional and sturdy. We noted a few minor problems that should have been flagged during quality control: The case has a warped plastic front plate, and its top was difficult to remove and replace. A lock and a pair of reset and turbo speed push buttons are conveniently located in front. Three half-height drive bays are accessible from the outside, as are the two 25-pin serial ports in the rear.

The attractive, compact Equity II+ is nicely constructed and designed for quick setup and ease of use. Two small plastic doors on the front keep the keyboard plug out of your way and hide the reset, CPU-speed, and monitor (mono or color) buttons so that you can't push them by accident. The power light on the front glows orange if you run at 8MHz and green at 12MHz. The use of nine screws to secure the case to the metal chassis is overkill; trying to get inside can be frustrating.

UNDER THE HOOD

The PC40-III's most impressive component is its motherboard, which has built-in features unusual in other ATs: 16-bit VGA circuitry (16-bit VGA is faster than 8-bit) and support for a smart 16-bit hard drive with built-in controller. The hard drive controller supports a 1–1 hard drive interleave ratio setting that permits fast data transfer. Commodore formats the hard drive with DOS, which many compatible manufacturers don't. During boot-up, the BIOS checks for expansion hardware and automatically configures the on-board circuitry to accommodate any boards you've installed. The built-in serial, parallel, and mouse ports are set to use port addresses not used by any expansion hardware; if no addresses are available, the BIOS disables them to prevent conflicts with expansion hardware. The BIOS also disables the built-in VGA, should you install an EGA or VGA board.

The system board only supports two half-height floppy drives and one half-

height hard drive—as many as there is space for. The internal 3½-inch hard drive mounts on its side to the left of the floppy drive. The 112-watt power supply is adequate because of the power-efficient, integrated motherboard. In spite of this compact design, all of the components you might need to reach are accessible. Four empty slots are plenty for future expansion.

The Data-286's six-slot system board is clean and uncluttered. A 12MHz CPU running at zero wait states, a Texas Instruments Inc. logic chip set, and 1MB of socketed 100-ns 256K DRAMs make up the computing end. The RAM sockets can also accommodate 1MB DRAM chips to provide up to 4MB of RAM on the system board. The standard MFM floppy- and hard-drive controller supports a 1–1 interleave ratio setting. Dataworld also sells an RLL controller, which boosts the effective capacity of the hard drive to 66MB. The serial ports are attached by a tether cable to the system board, and a parallel printer port is mounted on an I/O card in one of the expansion slots. All of the components can be easily reached without first removing other components.

Although the interior of the compact Equity II+ is crowded, everything you need to get at is accessible. The unit has three drive bays: The hard drive is on the bottom and the floppy drive is on top; the middle bay is empty. A daughterboard is attached vertically to the motherboard—a space-saving setup—and holds 640K of memory. The hard drive controller is a Western Digital board; the floppy drive controller is separate and includes the parallel and 9-pin serial ports. With the video card installed, one 8-bit and two 16-bit expansion slots remain empty. Spring-clip attachments grip ►

REVIEW UNIT FEATURES

COMPUTER	PC40-III	DATA-286	EQUITY II+
Manufacturer	Commodore Business Machines Inc. 1200 Wilson Drive West Chester, PA 19380 215-431-9100	Dataworld Inc. 3733 San Gabriel River Parkway Pico Rivera, CA 90660-1495 800-736-3282	Epson America Inc. 2780 Lomita Blvd. Torrance, CA 90505 800-421-5426
CPU	Intel N80286-12	Intel N80286-12	AMD R80286-12/S
BIOS	Commodore 286 BIOS Ver. 2.0	Phoenix Technologies Ver. 3.10.00	ROM Ver. 2.02 01/22/88 Seiko Epson Corp.
RAM	1MB	1MB	640K
Clock Speed (MHz)	6/8/12	12	8/12
Power Supply (watts)	112	200	110
Slots	one full-length 8-bit, three full-length 16-bit	two full 8-bit, four full 16-bit	three full 8-bit, three full 16-bit
Keyboard	101-key AT enhanced	Focus Electronic Co. Ltd. FK-2002 101-key AT enhanced	Epson 101-key AT enhanced
Monitor	Commodore 1403 14-inch VGA monochrome	NEC Multisync II 13-in. color	Epson EGA
Video Circuitry	VGA adapter circuitry built into motherboard	Paradise VGA adapter	Paradise EGA adapter
Floppy Drives	one 1.2MB 5¼-in. Chinon F2-506	one 1.2MB 5¼-in. TEAC FD-55GFR	one 1.2MB 5¼-in. Canon 5501
Hard Drives	one 40MB 19-ms Quantum Pro-drive 40AT; 16-bit, 1:1 hard drive controller built into drive	one 44MB 25-ms Toshiba MK134FA-I	one 40MB 28-ms Control Data 94205-51
Operating System	MS-DOS 3.3, GW-Basic 3.22	MS-DOS 3.30, GW-Basic 3.22	MS-DOS 3.3, GW-Basic 3.22
Ports	one parallel, one 25-pin serial, one 9-pin mouse	one parallel, two 25-pin serial	one parallel, one 9-pin serial
Math Coprocessor Socket	yes	yes	yes
Dimensions	5⅝ in. (H), 14 in. (W), 15½ in. (D)	6½ in. (H), 19½ in. (W), 16½ in. (D)	6⅛ in. (H), 15¾ in. (W), 16⅜ in. (D)
Weight (lbs.)	21 9/10	42	25
FCC Rating	B	B	B
Warranty	one year, parts and labor	one year, parts and labor	one year, parts and labor
Extra Features	none	video tutorial, Point and Shoot (menu generator)	Enhanced Epson MS-DOS with Xtree (file- and disk-management utility)
Review Unit Price	$2,595	$2,759	$3,897
Options	Base model (see text), $2,395; 720K 3½-in. floppy drive, $119.95; Commodore mouse with software, $89.95.	Base model (see text), $1,195; 2,400-bps modem, $125; MS-DOS 3.3 with Basic 3.3, $75; Toshiba 109MB hard drive, $695; 40MB tape drive, $319; 1.44MB 3½-in. floppy drive, $125.	Base model (see text), $1,899; base model with 40MB hard drive, $2,999; 1.2MB 5¼-in. floppy drive, $299; 720K 3½-in. floppy drive, $169; 12-in. monochrome monitor, $149; 13-in. EGA monitor, $599; MDA video card, $149; EGA video card, $299.

the expansion slot covers tightly and seal in radio-frequency emissions.

Documentation

The Commodore manuals are thorough and effective. The *Operations Guide* tells you everything worth knowing about the PC40-III and covers setup and operation, including the DOS basics needed to work with disks and drives. A series of appendixes provide complete technical information on more exotic procedures, such as setting the video DIP switches on the back of the unit. The MS-DOS and Basic manuals have short introductory learning sections and larger user's reference sections that describe commands in alphabetical order.

Dataworld's documentation consists of the *Data-286 User's Guide*, a bare-bones offering that provides the essential setup and technical information you'll need to configure the system. Dataworld also provides a 30-minute video tape called *Making the Connection: How to Set Up and Use Your PC*. Users with moderate experience shouldn't have much trouble getting up and running without the video aid. The 64-page *Baby 286IO Mini System Board Reference Manual* provides technical specifications. The keyboard, monitor, and video display adapter come with small individual manuals.

Documentation for the Equity II+ is above average. The clearly written and illustrated *User's Guide* steps you through the basic setup and use of the computer. The system also comes with a reference disk, good DOS and Basic manuals, and a small user's guide on the monitor.

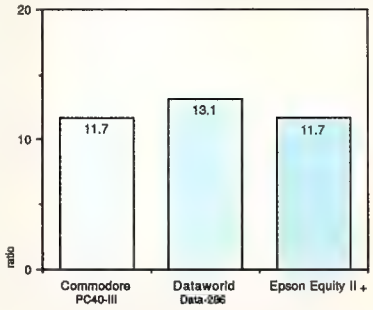
Performance

On the tests that measure CPU speed—the Norton Sysinfo, Memory-Access, and Spreadsheet-Recalculation—the 12MHz Commodore PC40-III performs only adequately because its slow 100-ns RAM chips require the CPU to operate with one wait state. However, the Quantum "smart" hard drive with built-in controller and 1–1 interleave ratio performs fast enough in both random-access and data-transfer tests to make overall performance above average.

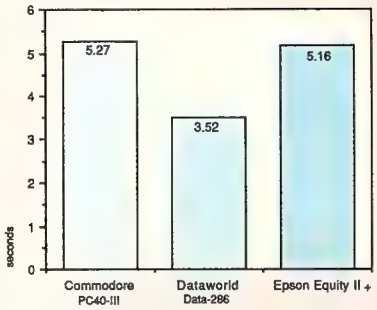
Dataworld's 12MHz, zero-wait-state Data-286 performs well in all tests. Although its hard drive system isn't as fast as the Commodore's, it's still impressive. In contrast, the Epson Equity II+ provides only average performance for an AT. A wait state in the memory-access cycle hampers its 12MHz CPU, and the hard drive—though fast in the ►

BENCHMARKS

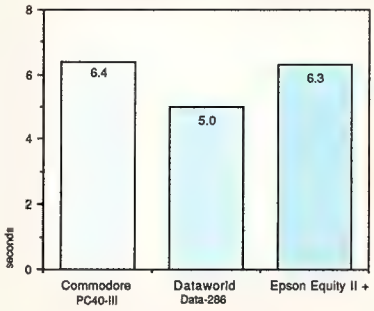
Norton Utilities Sysinfo Test
Performance ratio compared with the IBM PC
(higher number means better performance)



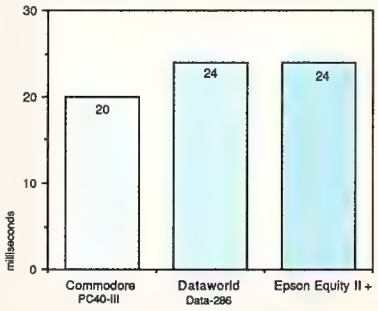
Memory-Access Test
(lower number means better performance)



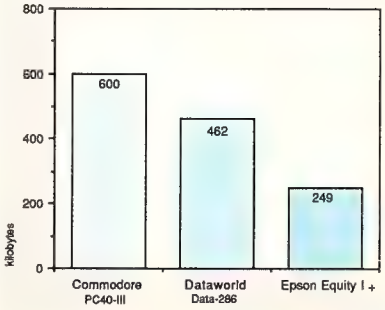
Spreadsheet-Recalculation Test
(lower number means better performance)



Random-Access Test
(lower number means better performance)



Data-Transfer Test
(higher number means better performance)



THE NORTON UTILITIES SYSINFO TEST compares a computer's performance with that of a 4.77MHz IBM PC. The test combines math and memory-access instructions to evaluate CPU speed.

THE MEMORY-ACCESS TEST measures how quickly a computer moves information within memory. The results are relevant to all applications but are particularly useful in judging how fast a computer can complete such operations as popping a window onto the screen or carrying out a word processor's block move. The test, written by the *PC Resource* technical staff, moves a 64K block of data from one section of memory to another. This sequence is repeated 300 times.

THE SPREADSHEET-RECALCULATION TEST is a practical test of CPU number crunching. The test uses the recalculation function in Lotus Development Corp.'s 1-2-3 Release 2.01 to recalculate a 294K spreadsheet immediately after loading it into memory. It is accurate to the half-second.

THE RANDOM-ACCESS TEST measures hard drive performance by computing the speed at which the computer can randomly access data stored on a hard disk. Results are most relevant to database programs that access files on disk while retrieving and sorting records. The test, a segment of Core International's Core Test, provides an average measure of how quickly the hard drive's read/write heads move from one spot to another.

THE DATA-TRANSFER TEST measures how quickly a computer can move data from a hard disk into memory. Results are most relevant to applications, such as word processors and spreadsheets, that read in large files stored on a hard disk. The test, a segment of the Core Test, evaluates the combined performance of the CPU, disk controller, and hard drive. The transfer rate tells how much data is moved from the disk to memory in one second.

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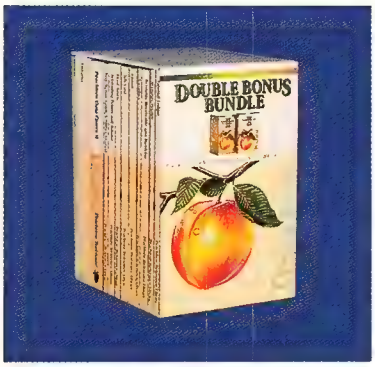

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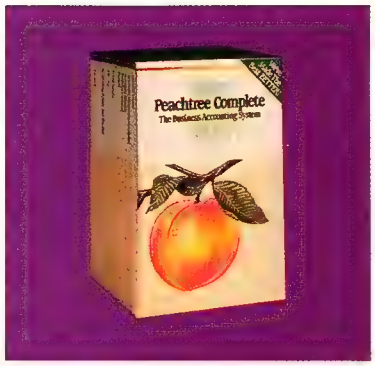

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SUMMARY

Commodore's PC40-III provides solid AT computing power at a price rivaling that of many mail-order machines. Its integrated motherboard, which incorporates high-performance VGA video and smart hard drive support, is its most attractive feature. The PC40-III's VGA is hardware compatible with EGA, CGA, and MDA, and its hard drive controller and 40MB hard drive are fast enough to compensate for average CPU performance. Although the unit can't accommodate more than three drives, it has four full-sized slots available for expansion.

The Data-286 provides good value. You get a fast, sturdy AT compatible with a brand-name 16-bit Super VGA card, an NEC Multisync II VGA monitor, and a 44MB 25-ms hard drive. If you don't mind the no-frills documentation or extra $75 expense for MS-DOS and Basic (included in the $2,759 review unit price), Data-286 is a bargain.

The Equity II+ is a compact, good-looking AT with some unique features; for example, hinged doors on the front keep the keyboard connector and reset button out of the way, and the sturdy keyboard's concave shape makes typing a pleasure. In spite of the tight fit under the hood, you can add to the 640K RAM in increments of 2MB on an expansion card. The three empty slots are enough for future upgrades. Another plus is the high level of dealership support and service. But in terms of performance (only so-so) and price ($3,897 for the review unit), it doesn't compare favorably to the other two machines.

EXTRA FEATURES

We give the Data-286's extra features one star. A 30-minute video cassette holds a helpful setup tutorial. There's also a copy of Point and Shoot—a free-form menu generator that writes its own batch files, lets you add password protection, and provides a screen-blanking utility.

The Equity II+ comes with an enhanced version of DOS 3.3 that includes Executive Systems Inc.'s Xtree (a file- and disk-manager), on-line help for all DOS commands, a printer setup menu, and a menu-driven interface for often used MS-DOS commands. This package earns one star. ◆

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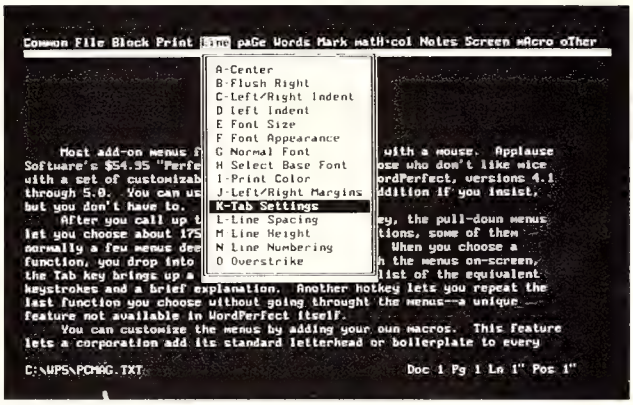

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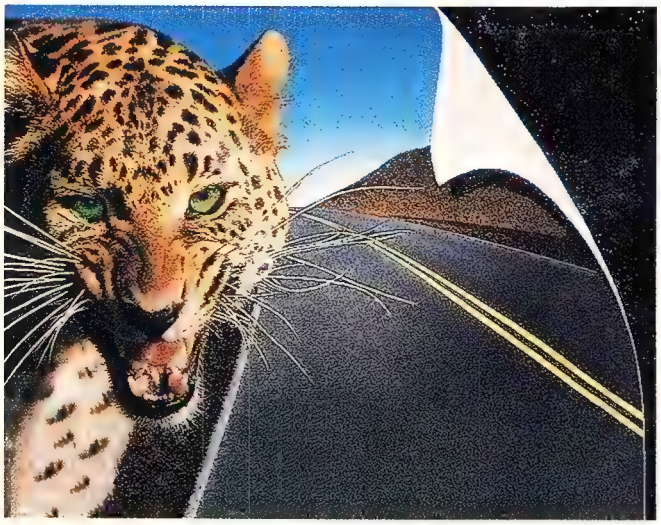
The Next Generation



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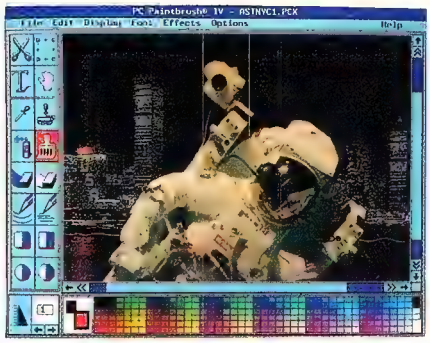

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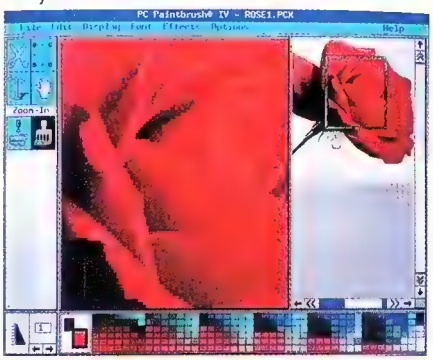

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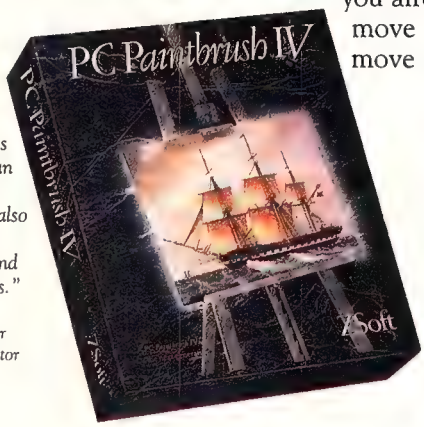

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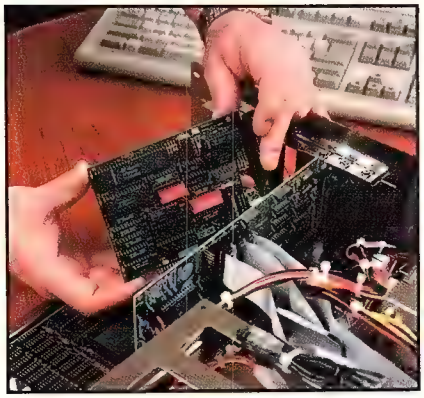

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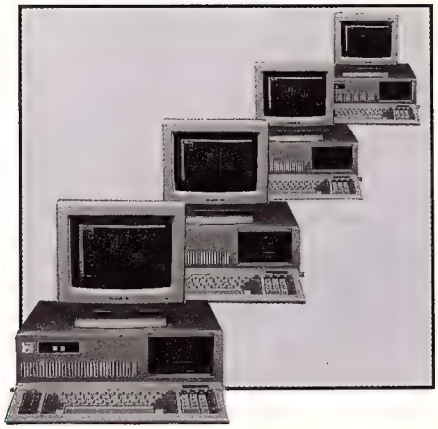

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BUYER'S GUIDE TO COMPATIBLES

THE PC RESOURCE *Micro Lab has put at least two or three clones through their paces each month for nearly two years. The results have been combined in this buyer's guide to give you a quick and easy way to educate yourself before beginning to shop for the computer that best fits your needs and pocketbook. Ratings are based on a 1–5 scale. A rating of 1 means the product or service is unacceptable, 2 means it is worse than average, 3 means it works as it should, 4 means it is better than average, and 5 means it is superlative. One star for extra features indicates a good value; a 2-star rating stands for superlative value.*

Because manufacturers of PC compatibles constantly strive to produce faster machines and hard drives, PC Resource *periodically reevaluates the performance ratings of each of the computers we've reviewed. If necessary, we adjust a machine's rating (as well as its summary rating) so that it reflects current standards for computer performance.*

System/Manufacturer[1]	Issue	Base[2]	Review Unit[3]	CPU Speed	Floppy Drive	Hard Drive	Memory	Monitor	Keyboard	Display	Main Unit	Under the Hood	Documentation	Performance	Support	Summary	Extra Features
XT COMPATIBLES																	
Amstrad PC1640 Amstrad U.S.A.	3/88	$736	$1,999	8MHz	one 360K	20MB	640K	EGA color	2	4	3	3	3	4	2	3.0	★
ARC Turbo Model 10 American Research Corp.	4/87	$695	$1,955	6.66MHz	two 360K	20MB	640K	TTL mono	3	3	3	3	2	3	3	2.8	
Beltron XT Turbo/20 Beltron Computer Corp.	9/88	$899	$1,453	10MHz	one 360K	20MB	640K	TTL mono	3	3	3	2	2	4	2	2.7	
Commodore Colt Commodore Business Machines Inc.	12/88	$999	$1,399.90	7.16MHz	two 360K	none	640K	TTL/analog/ composite	2	4	3	4	3	3	3	3.1	
Compuadd Turbo/10 Compuadd Corp.	9/88	$595	$944	10MHz	one 360K	20MB	640K	TTL mono	4	3	3	3	3	4	3	3.2	
Hitech SAM 2001 Hitech International Inc.	9/87	$744	$899	8MHz	one 360K	none	640K	TTL mono	3	3	3	3	3	4	3	3.1	
IBM Model 25 IBM Corp.	2/88	$1,350	$1,993	8MHz	two 360K	none	640K	analog color	4	4	4	4	2	3	3	3.4	
Innovation Model 1010XT Innovation Computer Corp.	8/87	$1,294	$1,176	4.77MHz	two 360K	20MB	640K	TTL mono	3	3	3	3	1	3	3	2.7	
Laser Compact XT Laser Computers Inc.	10/87	$599	$698	10MHz	one 360K	none	512K	TTL mono	2	3	2	3	3	4	2	2.7	
Magitronic T800 Magitronic Technology Inc.	9/88	$625	$1,035	10MHz	one 360K	20MB	640K	TTL mono	2	3	3	3	2	4	3	2.8	
PC Popular Model 20 Blue Chip Electronics Inc.	12/88	$1,499	$1,749.98	8MHz	one 360K	20MB	640K	CGA color	3	4	2	3	4	3	4	3.2	
Tandy 1000 HX Tandy Corp.	12/88	$699	$1,568.75	4.77MHz	two 720K	none	640K	CGA color	2	4	3	3	3	3	3	3.0	★
Ultra-Comp Turbo 10 Ultra-Comp	9/87	$659	$1,032.50	10MHz	two 360K	none	640K	TTL mono	3	3	3	3	1	4	3	2.8	
Zenith Z-159 Model 3 Zenith Data Systems	7/87	$2,199	$2,799	8MHz	one 360K	20MB	512K	TTL mono	4	5	4	4	4	4	3	4.0	
AT COMPATIBLES																	
Amdek System/286A Amdek Corp.	8/88	$2,499	$4,100	12.5MHz	one 1.2MB	40MB	1MB	EGA color	4	3	4	4	3	4	3	3.5	
Clone 286 Clone Computers	7/88	$1,399	$1,599	10MHz	one 1.2MB	40MB	1MB	TTL mono	2	3	3	3	2	3	4	2.8	
Compuadd 286/16 Compuadd Corp.	4/89	$1,495	$2,678	16MHz	one 1.2MB	40MB	1MB	VGA color	3	4	4	4	4	5	3	3.8	
Dell System 220 Dell Computer Corp.	11/88	$2,099	$3,318.95	20MHz	one 1.44MB	40MB	1MB	VGA color	4	3	5	4	5	5	5	4.4	
Headstart III Headstart Technologies Co.	6/89	$2,995	$3,790	12MHz	one 1.44MB, one 1.2MB	40MB	1MB	VGA color	4	3	4	3	4	4	5	3.9	★★
Hyundai Super-286C Hyundai Electronics America	10/88	$1,195	$2,880	10MHz	one 360K, one 1.2MB	30MB	640K	CGA color	3	4	3	4	3	3	4	3.4	

[1]Chart includes only reviewed systems that manufacturers are still distributing.
[2]Base prices are periodically updated.
[3]Review Unit prices reflect the cost of systems at the time of review.

Price | Features of the review unit | Ratings for the review unit

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T-1200FB	$2399.00	$1485.00
T-1200H	$3499.00	$2159.00
T-1200HB	$3699.00	$2275.00
T-1600	$4999.00	$3000.00
T-3100E	$4299.00	$2599.00
T-5100	$7199.00	$4300.00
T-5200	$9499.00	$5700.00

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FX-850	$ 549.00	$339.00
FX-1050	$ 799.00	$449.00
LQ-510	$ 529.00	$315.00
LQ-850	$ 859.00	$519.00
LQ-950	$ 949.00	$589.00
LQ-1050	$1199.00	$699.00
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NEC M3700 ES Cellular Phone	$ 895.00	$ 649.00
Mitsubishi Model 800 Transportable	$1495.00	$ 975.00
Mobira P-30 Hand Held Phone	$1395.00	$ 935.00
NEC 9100 Hand Held Phone	$1495.00	$1110.00
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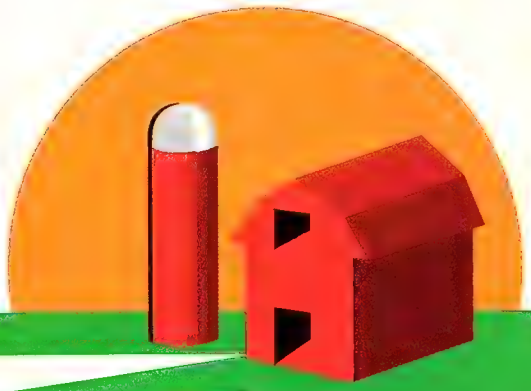

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System/Manufacturer[1]	Issue	Base[2]	Review Unit[3]	CPU Speed	Floppy Drive	Hard Drive	Memory	Monitor	Keyboard	Display	Main Unit	Under the Hood	Documentation	Performance	Support	Summary	Extra Features
AT COMPATIBLES cont.																	
Micro 1 286 + Power-12 Micro 1	1/88	$1,445	$2,595	12MHz	one 1.2MB	44MB	1MB	TTL mono	3	4	3	4	2	4	3	3.2	
Mitsubishi MP286 Mitsubishi Electronics America Inc.	11/87	$1,895	$4,495	8MHz	one 1.2MB	40MB	640K	EGA color	4	4	4	3	4	3	3	3.5	
MPC 2200V/VE American Mitac Corp.	4/89	$2,549	$3,637	16MHz	one 1.2MB, one 1.44MB	40MB	1MB	EGA color	3	4	4	4	3	5	3	3.7	
Rival 286-16 Arche Technologies Inc.	4/89	$2,595	$5,160	16MHz	one 1.2MB	44MB	4MB	TTL mono	3	4	4	4	4	5	4	4.0	
Rose Hill Model 1700 Rose Hill Systems	8/88	$1,275	$2,369	12MHz	one 1.2MB	40MB	1MB	EGA color	3	4	3	3	3	4	3	3.2	
Star BAT 286/12 Star Industries Inc.	3/89	$1,035	$1,864	12MHz	one 1.2MB	30MB	512K	TTL mono-chrome	2	3	2	3	3	4	3	2.8	★
Sysgen Prosystem Sysgen Inc.	8/88	$2,395	$3,294	12MHz	one 1.2MB, one 1.44MB	40MB	640K	EGA color	4	4	4	4	2	3	4	3.5	
Tandy 3000 NL Tandy Corp.	6/89	$1,699	$3,907	10MHz	one 1.44MB	40MB	640K	VGA color	5	3	3	4	2	3	3	3.3	★
TEC 286-12 Texas Express Computer	3/89	$1,600	$1,688	12MHz	one 1.2MB	40MB	1MB	TTL mono-chrome	3	3	4	3	2	4	3	3.1	
Tussey Swan 286/10 Tussey Computer Products	3/89	$999	$1,738	10MHz	one 1.2MB	40MB	1MB	TTL mono-chrome	3	3	3	3	4	4	4	3.4	
Uniq AT-Turbo 286 Unique Technology Inc.	10/88	$568	$2,209	12MHz	one 1.2MB	40MB	1MB	EGA color	4	4	3	3	2	3	4	3.2	
Vector Excalibur 286 Vector Computer Corp.	11/88	$1,495	$3,668	20MHz	one 1.2MB	65MB	512K	EGA color	4	2	3	4	2	5	4	3.4	
Wyse PC 286 Model 2108 Wyse Technology	7/88	$1,599	$3,347	8MHz	one 1.2MB	20MB	512K	EGA color	4	4	3	4	3	2	3	3.2	
386 COMPUTERS																	
Compaq Deskpro 386/25 Compaq Computer Corp.	1/89	$8,299	$13,299	25MHz	one 1.2MB	60MB	3MB	VGA color	3	3	4	4	5	5	3	3.8	
IBM PS/2 Model 70-A21 IBM Corp.	1/89	$11,295	$16,008	25MHz	one 1.44MB	120MB	4MB	VGA color	4	2	5	5	3	5	3	3.8	
IBM PS/2 Model 80 IBM Corp.	6/88	$6,995	$10,385	16MHz	one 1.44MB	40MB	4MB	analog color	4	5	5	5	2	4	3	4.0	
ME 386-20 Micro Express	5/89	$1,950	$2,725	20MHz	one 1.2MB	40MB	1MB	TTL mono	3	4	2	3	2	4	4	3.1	
Northgate 386/16 Northgate Computer Systems	5/89	$2,699	$2,699	16MHz	one 1.2MB, one 1.44MB	65MB	1MB	TTL mono	5	4	3	3	4	3	4	3.7	
Tandy 4000 Tandy Corp.	6/88	$2,999	$6,902	16MHz	one 1.44MB	40MB	3MB	EGA color	2	4	3	3	3	3	3	3.0	
XT 386 Rose Rose Hill Systems	5/89	$1,895	$2,575	16MHz	one 1.2MB	65MB	1MB	TTL mono	3	4	3	4	2	3	3	3.1	
Zeos 386-25/DT Zeos International	1/89	$3,845	$6,636	25MHz	one 1.2MB	175MB	4MB	VGA color	3	3	3	3	2	5	3	3.1	
PORTABLES																	
IBM PC Convertible Model 3 IBM Corp.	12/87	$1,200	$2,400	4.77MHz	two 720K	none	640K	backlit LCD	4	4	3	4	4	2	3	3.4	
Mitsubishi MP 286L Mitsubishi Electronics America Inc.	2/89	$3,195	$3,995	12MHz	one 1.44MB	20MB	640K	backlit LCD	4	5	3	3	4	4	3	3.7	
NEC Multispeed EL NEC Home Electronics Inc.	4/88	$2,499	$2,495	9.54MHz	two 720K	none	640K	backlit LCD	4	3	3	3	4	4	3	3.4	★
Sharp PC-4502 Sharp Electronics Corp.	4/88	$1,795	$1,795	7.16MHz	two 720K	none	640K	backlit LCD	2	3	3	3	2	3	3	2.7	
Tandy 1400 LT Tandy Corp.	4/88	$1,799	$1,599	7.16MHz	two 720K	none	768K	backlit LCD	3	3	4	3	3	3	3	3.1	
Toshiba T3200 Toshiba America Inc.	2/89	$5,499	$5,799	12MHz	one 720K	40MB	1MB	gas plasma	4	4	4	4	4	5	4	4.1	★
Zenith Supersport 286 Zenith Data Systems	2/89	$4,999	$4,999	12MHz	one 1.44MB	20MB	1MB	backlit LCD	3	5	4	4	4	5	3	4.0	

[1]Chart includes only reviewed systems that manufacturers are still distributing.
[2]Base prices are periodically updated.
[3]Review Unit prices reflect the cost of systems at the time of review.

Price | Features of the review unit | Ratings for the review unit

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The perfect budget-priced home computer. A solid, reliable, compatible performer.

$549

Base System with Single Floppy, No Video

XT10	VIDEO OPTIONS Include Monitor & Video Adapter			
Drive Options	Mono†	CGA	EGA	VGA
Single Floppy	$699	$869	$1098	$1198
Dual Floppies	$779	$949	$1178	$1278
*w/20MB (65ms) Hard Drive	$979	$1149	$1378	$1478
*w/32MB (40ms) Hard Drive	$979	$1149	$1378	$1478

† Includes Single 360K Floppy Drive
* Upgrade from 12" to 14" Flat Screen, add $49

Swan 286/12

You probably never thought you could get into a reliable business system this inexpensively. But with the 286/12, you can. Now.

$999

Base System with Single Floppy, No Video

286/12	VIDEO OPTIONS Include Monitor & Video Adapter			
Drive Options	Mono	14" Flat Mono	EGA	VGA
w/32MB (40ms) & 1:1 Interleave	$1399	$1448	$1748	$1848
w/40MB (28ms) & 1:1 Interleave	$1499	$1548	$1898	$1998
w/80MB (28ms) & 1:1 Interleave	$1849	$1898	$2248	$2348

* Items returned must be as-new, without modification or damage. Sorry ... shipping charges and upgrade fees are not refundable.

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CPU	8088-1	80286	80386SX	80386
Speed (MHz)	10/4.77	12/6	16/8	20/8
BIOS	Phoenix	Phoenix	C & T	Phoenix
Norton SI Rating v 4.0	2.1	11.2	17.6	22.0
Wait State	0	0	0	0
Standard Memory	640K	512K	1MB	1MB
Shadow BIOS	—	—	—	384K
Memory Upgrades	—	1MB	1.5/2/3/5/6/8MB	2/4/8/10/16MB
Coprocessor Support	8087	80287	80387SX	80287 or 80387
Expansion Slots: 32-bit	—	—	—	1
Expansion Slots: 16-bit	—	6	6	4
Expansion Slots: 8-bit	8	2	2	3
Dual HD/FD Controller	w/HD systems	Yes	Yes	Yes
Device Bays (Exposed/Internal)	2 Exp./2 Int.	3 Exp./2 Int.	3 Exp./1 Int.	3 Exp./2 Int.
Serial Ports	1	1	1	2
Additional I/O Ports	1 Parallel and 1 Game Port			
Power Supply	150W	200W	200W	200W
Keyboard	101 Key	101 Key	101 Key	101 Key
Additional Features	Clock Calendar w/Battery Backup and Setup/Utilities Disk			
OPTIONS:	XT10	286/12	386SX	386/20D
3.5" Floppy Drive	Optional	Your choice	Your choice	Your choice
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w/40MB (28ms) & 1:1 Interleave	$1999	$2048	$2198	$2498
w/80MB (28ms) & 1:1 Interleave	$2349	$2398	$2548	$2848
w/150MB (17ms) ESDI w/1:1 Interleave	$2994	$3043	$3193	$3493

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— *Computer Shopper, April 1989*

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Base System with Single Floppy, No Video

386/20D	VIDEO OPTIONS Include Monitor & Video Adapter			
Drive Options	Mono	14" Flat Mono	VGA Mono	VGA Color
w/40MB (28ms) & 1:1 Interleave	$2749	$2798	$2948	$3248
w/80MB (28ms) & 1:1 Interleave	$3049	$3098	$3248	$3548
w/150MB (17ms) ESDI w/1:1 Interleave	$3694	$3743	$3893	$4193

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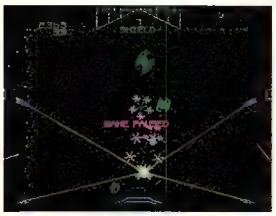

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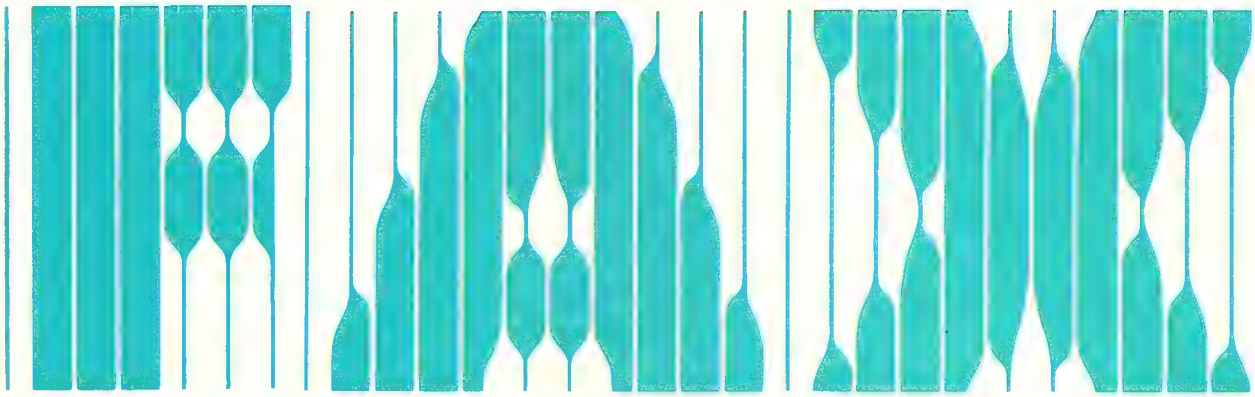
The Basic



One of the hottest trends in high tech, fax can speed communications across town or around the world. Find out how to get into the race.

by DAVID ESSEX

IN THE OLD days—say, 1987—overnight delivery services were undisputedly the most popular way to speed documents cross-country. People knew that for a pricey $10–$15, they could slip a letter into a special envelope in Des Moines with the near certainty that it would show up in Denver the next day. Federal Express, UPS Red, Express Mail, and Airborne Express carried the bulk of the country's high-speed, top-priority business communications.

The cost of those services hasn't changed dramatically, but there's a new player in the game: Fax (named for its ability to produce a reasonable facsimile) can speed communications over long distances, and it may soon become the impatient business person's carrier of choice. Fax technology, invented in 1842 and used in stock brokerages and newspaper offices for decades, kicked into high gear in 1983 with the adoption of an international standard for high-speed, 9,600 bits-per-second (bps) transmission. Fax technology offers speed and convenience—for a price—and sales figures indicate that the business world is willing to pay for these benefits. CAP International, a marketing firm in Norwell, Mass., estimates that approximately 6 million fax machines and boards were in place by the end of 1988 and that 6.3 million more will be sold between 1989 and 1992. In the last year or two, "I'll fax it to you" has become an everyday expression.

PC-based fax, a recent variation of the standalone machine, is one of the cheapest ways for the small-business and home-office PC user to get in on the fax revolution. With a $500 fax board in your computer, you can send and receive text and graphics files to and from other PCs and regular fax machines. In addition to speed and convenience, fax boards have several features lacking in a standalone machine. For instance, they let you broadcast, or send the same document, to hundreds of other fax devices with one command. This feature could be extremely useful to a regional sales manager, for instance, who must frequently contact a large, scattered sales staff. Fax boards also allow delayed transmission (using your PC's clock/calendar to program transmission hours, days, and even months in advance), and they produce crisp, clean transmissions.

In spite of the benefits, there are tradeoffs—not to mention tough questions—for the first-time fax user. How difficult is it to send and receive a fax from a computer? What features should you look for in a fax board, and what can you do without? What about faxing hard copy—do you need a scanner to first capture the hard copy in your computer? Is a fax board with a scanner cost productive, or would you be better off with a standalone fax machine?

Assuming you already have a general understanding of fax technology (if not, see "How Fax Works" on page 56), you still must examine your own needs before you shop. Points to consider include the volume and size of the transmissions you'll be sending, whether or not you need a fax device with broadcasting ability, the value you place on speed (a 4,600-bps board costs less than a full-speed 9,600-bps board), and the applications you intend to use. Once you know what you need, you'll have a large array of boards to choose from. I'll identify some of the more affordable brands and what they offer.

System requirements for running a fax board aren't stringent in this age of entry-level 286s and powerhouse 386s. A hard disk and graphics board (Hercules monochrome or color) are the minimum requirements—the hard disk to store converted and incoming files and the graphics board to handle bit mapping. (A Monochrome Display Adapter, or MDA, board will not run graphics programs.) You might need 640K or more of RAM if the memory-resident program that the fax board uses for file conversion is larger than 100K.

PC fax boards are both more and less capable than standalone fax machines. Even without a scanner and printer (both can be added on), fax boards offer a unique type of communication when melded with the computer's memory and graphics abilities. They go beyond modems by being able to transmit a document's likeness instead of merely its contents. "The fax board turns 3 million other faxes into remote printers for your computer," says

Steve Ide, vice president of sales and marketing at Brooktrout Technology Inc. in Wellesley, Mass.

PROS AND CONS

Chief among fax board strengths is broadcasting. A fax board takes advantage of your computer's memory to transmit the same information to multiple locations automatically. You don't have to stand and feed the information into it over and over again, as you would with a cheaper (under $1,500) standalone fax machine that has limited memory.

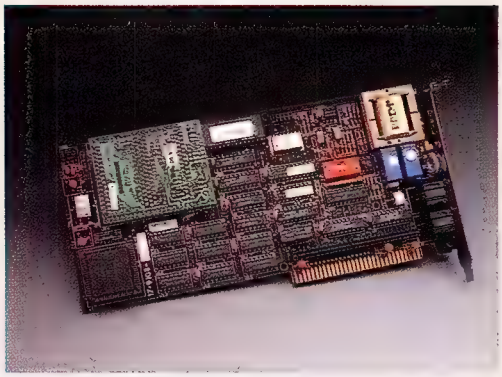
Delayed transmission is another fax-board plus: You can program transmission of more than one document—including those you want to broadcast—to occur during hours when phone rates are lowest. Even if cheaper standalones could be programmed for delayed transmission, they lack the automatic sheet feeders that you need to transmit a second page.

Computer-generated fax printouts are usually much crisper than those of standalone fax machines because they're "clean," which means they've been converted directly into digital fax format and therefore are unlikely to suffer data loss other than the glitches that can result from transmission over poor-quality lines. By comparison, standalone fax documents usually start out as photocopies and get pulled through a mechanical sheet feeder, jerking slightly from side to side the whole way. The resulting image is often wavy and blurred.

The picture isn't all rosy for fax boards. Besides lacking an inherent way to scan or produce hard copy, fax boards are somewhat cumbersome to use. While standalone machines only require you to press a few buttons, dial the number, and feed in the paper, fax boards require a certain level of computer literacy. To confidently use all of a fax board's features, you must be comfortable moving through sometimes cryptic menus and editing graphics files.

Buying a fax board can also include some hidden ►

Fax Boards Vs. Low-end Standalones:



Fax Board Advantages

- ☐ Can broadcast hundreds of documents with one command.
- ☐ Allows flexible file creation and editing.
- ☐ Allows delayed transmission.
- ☐ Usually produces superior print quality.
- ☐ Relatively inexpensive.

Fax Board Disadvantages

- ☐ Somewhat cumbersome to use.
- ☐ Installation can be time consuming.
- ☐ Software is sometimes buggy.
- ☐ Hogs hard disk.
- ☐ Memory-resident programs sometimes misbehave.
- ☐ Lacks inherent ability to scan hard copy.

Standalone Advantages

- ☐ Easy to use.
- ☐ Simple to install.
- ☐ Allows hard-copy faxing.
- ☐ Has built-in telephone.
- ☐ Operates unattended.

Standalone Disadvantages

- ☐ Can't broadcast (lacks sufficient memory and multiple sheet feeder).
- ☐ Lacks paper cutter.
- ☐ Lacks advanced dialing capabilities of high-end standalone machines and fax boards.

How FAX Works

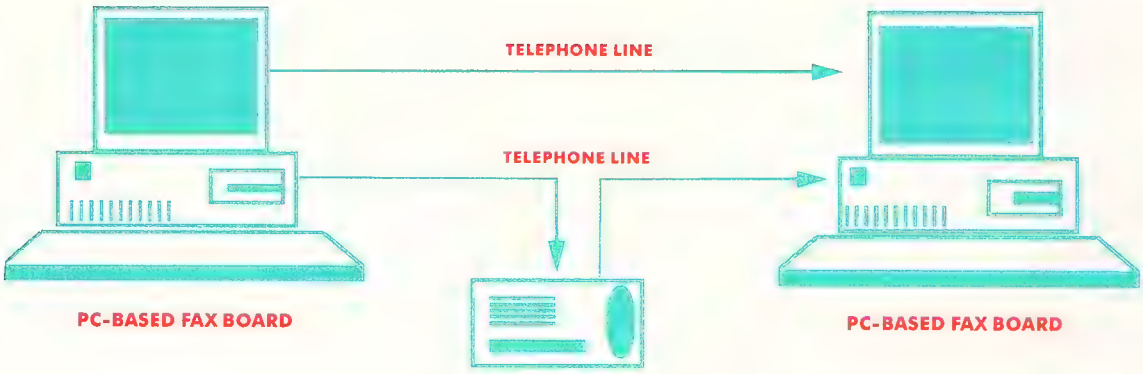
FAX IS A WAY to encode images for transmission over phone lines. In the standalone machine, an electronic dialer establishes a phone connection with the receiving machine. An optical scanner then digitizes the page as it is fed through, and a chip set compresses and encodes the data for immediate transmission. The digital stream passes along the phone lines to the receiving machine where it is decompressed, converted to standard binary code, and printed. The printout usually is done on thermal paper, a heat-sensitive material that forms a black mark wherever a hot print head touches it.

PC fax boards have the same "brains," or chip set, as standalone faxes, but they can function without the scanning and printing mechanisms needed to process hard copy. The document to be faxed must exist in electronic form—either a graphics file or an ASCII file created with a word processor or text editor. The board encodes the file into a standardized, bit-mapped form. This standard—the Modified Huffman Code—breaks a document down into dots roughly five-thousandths of an inch high (and approximately five- or ten-thousandths of an inch wide, depending on the resolution) and compresses white space by concisely describing its length.

The fax board transfers the encoded file from disk into RAM, dials the number of the receiving device, goes through a "handshaking" sequence to make sure both devices are communicating properly, and transmits the fax. Some boards perform the conversion during transmission instead of loading a preconverted file from disk. A message flashes on screen to let you know the fax was received at the other end.

To receive a transmission, the board accepts the incoming call and responds to the handshaking signals. Then—unless it has its own coprocessor chip to handle operations in the background—it interrupts any work in progress on the PC. The board immediately writes the transmitted file to the hard disk without converting it.

The illustration summarizes the procedures performed during fax operation.



HOW IT TRANSMITS

1. Merges graphics and text files that have been previously converted into compressed fax code and stored on disk.
2. Dials phone number and establishes two-way communication with receiving fax.
3. Transmits (some boards convert file to fax code during transmission).

HOW IT RECEIVES

1. Accepts incoming call and establishes two-way communication with transmitting fax.
2. Translates fax code into standard binary code and prints it on thermal printer.

HOW IT TRANSMITS

1. Dials phone number and establishes two-way communication with receiving fax.
2. Scans document, converts it into compressed fax code, and transmits it.

HOW IT RECEIVES

1. Accepts incoming call (usually interrupting work in progress).
2. Receives transmission.
3. Stores file in compressed fax code on hard disk for later conversion into standard binary code. (Optionally, it can convert file to binary and print it out immediately.)

costs: You might have to invest in a larger hard drive and more RAM. Incoming fax files—including unsolicited ones—can accumulate on your hard disk faster than you can remove them, and memory-resident programs used for file conversion can gobble up 150K or more of RAM (although many, including Brooktrout's Faxmail 96 and Everex Systems Inc.'s Everfax EF-12/48, consume less than 100K). Worse, these file-conversion programs can conflict with other programs residing in RAM and cause system crashes and unfinished file conversions.

In addition, two types of performance problems have plagued fax boards, according to Judith Pirani, an industry analyst at CAP International. Pirani cites user complaints that some fax boards won't work with other faxes despite claims of 100 percent compatibility. Also, software has been buggy and less than user-friendly—an added frustration. Board vendors are working on the problem. Everex, for instance, sent out a press release in January trumpeting a software update for its Everfax EF-12/48, an external fax released a year earlier. "Buying a fax board has been like buying the first of a new line of cars," Pirani says. "The second year's models are always better because the manufacturer has had time to work out the kinks."

MASTERING THE MECHANICS

Installing and using a fax board isn't as easy as the manufacturers would have you believe. Just getting the card to work can be complicated. For instance, you might have to set DIP switches if the board's memory addresses conflict with those of other devices. Also, no matter how good the documentation is, installation usually requires trial and error. If your technical background is limited, you might be wise to seek professional assistance. On the other hand, if you don't have to reach for a manual to find out what jumper settings and IRQ (interrupt request) lines are, you'll probably have no more trouble installing a fax board than you would any other expansion device (see "Installing a Fax Board" on page 89).

Once you have the board and software installed, you have to decide whether to attach its familiar RJ-11 connector to a separate phone line or your regular voice line. The easiest solution is a dedicated line for fax, if your transmission volume justifies the expense of installing and maintaining a separate line. Forcing the fax to share your voice line is fraught with perils, despite the fact that most boards provide a switch for alternating between fax and voice. Eager faxers can call first and ask you to switch to fax mode, but those who call when the fax is already active will be assaulted by a screech reminiscent of Yoko Ono at 78 rpm.

Hardware solutions are becoming available, including a Voice/Data Switch from Rainier Technologies (17950 N.E. 65th St., Redmond, WA 98052, 206-881-5304) that intercepts calls like an answering machine and prompts callers to press numeral 3 for voice transmission or to hold the line before sending a fax. The device works with both standalone machines and fax boards, but it involves yet another expense—$349.95.

All but a few of the under-$500 boards come with utilities for converting faxes to and from popular graphics formats, allowing you to spruce up your faxes with letterheads, logos, special type fonts, and other tricks. PC Paintbrush, Dr. Halo, and TIFF (Tag Image File Format) are most commonly supported; you sometimes see support for GEM Draw, Windows Paint, and popular word processor formats. The utilities only handle conversion between fax and graphics format. Full-fledged graphics programs are not included, although some boards have limited graphics editors.

There's no hope of treating the incoming file like a regular DOS or ASCII file unless your board works with optical character recognition (OCR) software. Remember: the file at this point contains an image, or impression, of the characters that make up its data. The characters aren't coded in the ASCII format the computer is hardwired to understand, and the graphics elements are represented in strings of bits that mean nothing to the computer. To make the computer translate the faxed image into ASCII or some other standard format, you need the same type of OCR software that scanners use to recognize characters on a page. None of the under- ►

Selected Fax Boards and Standalone Fax Machines

Boards

AMERICAN DATA TECHNOLOGY INC.
44 W. Bellevue Drive
Suite 6
Pasadena, CA 91105
818-578-1339
SMARTFAX 48 ($299).
A 4,800-bps board that can broadcast faxes and delay transmission.

SMARTFAX ($499).
A 9,600-bps board with the same features as the Smartfax 48.

SMARTFAX PLUS ($799).
A 9,600-bps board with a 1,200/2,400-bps modem and on-board coprocessor.

BROOKTROUT TECHNOLOGY INC.
110 Cedar St.
Wellesley Hills, MA 02181
617-235-3026
FAXMAIL 96 ($499).
A 9,600-bps board with an on-board coprocessor. Has automatic polling and other advanced transmission features.

BROTHER INTERNATIONAL CORP.
8 Corporate Place
Piscataway, NJ 08854
201-981-0300
INTELLIFAX ($999).
A 9,600-bps board with a 1,200-bps modem and coprocessor on board. Comes with a text editor.

THE COMPLETE PC
521 Cottonwood Drive
Milpitas, CA 95035
408-434-0145
CFAX/4800 ($399).
A 4,800-bps board with an on-board coprocessor. Has automatic polling, broadcasting, and delayed transmission capabilities.

CFAX/9600 ($699).
A 9,600-bps board with an on-board coprocessor. Has a wide range of advanced transmission features.

COMPLETE COMMUNICATOR ($899).
A 9,600-bps board with an on-board, 2,400-bps modem and voice mail, along with the advanced transmission features of the CFax/9600.

DEST CORP.
1201 Cadillac Court
Milpitas, CA 95035
408-946-7100
FACSIMILE PAC ($995).
A 9,600-bps board with an on-board coprocessor. Has application print capture.

EVEREX SYSTEMS INC.
48431 Milmont Drive
Fremont, CA 94538
415-498-1111
EVERFAX EF-12/48 ($495).
An external, 4,800-bps fax device with an on-board, 1,200-bps modem. Connects to an RS-232 serial port.

GAMMALINK
2452 Embarcadero Way
Palo Alto, CA 94303
415-856-7421
GAMMAFAX NA ($495).
A 9,600-bps board featuring automatic polling, delayed transmission, and broadcasting capabilities.

GAMMAFAX MC ($795).
A Micro Channel version of Gammafax NA.

GAMMAFAX CP ($1,095).
A 9,600-bps board with an on-board coprocessor and 256K RAM. Converts files to fax format on the fly.

INTEL CORP. (PERSONAL COMPUTER ENHANCEMENT OPERATION)
Mailstop CO3-07
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497
800-538-3373
CONNECTION COPROCESSOR ($995).
A 9,600-bps board with an on-board coprocessor. Supports the DCA/Intel Communicating Applications Specification (CAS), a proposed universal standard for PC-based communication.

PANASONIC INDUSTRIAL CO.
2 Panasonic Way
Secaucus, NJ 07094
201-348-7000
FX-BM89 + FAX PARTNER ($999).
A 9,600-bps board with an on-board coprocessor. Has automatic polling and other advanced transmission features.

QUADRAM
1 Quad Way
Norcross, GA 30093
404-564-5566
JT FAX INTERNAL ($295).
A 4,800-bps board with delayed transmission and broadcasting capabilities.

JT FAX PORTABLE ($495).
A 4,800-bps board that can be used with both laptops and desktops. Has the same advanced transmission features as JT Fax Internal.

JT FAX PORTABLE ($495).
An external, 4,800-bps fax device that connects to an RS-232 serial port. Uses the same menuing system as the other Quadram products.

JT FAX PRO 96 ($495).
A 9,600-bps board with a 2,400-bps modem and an on-board coprocessor. Transmits through an RS-232 serial port. Conforms to an extension of the Hayes AT command set that Quadram touts as an alternative standard to the DCA/Intel CAS. Operates in background.

JT FAX PS/Q ($595).
A Micro Channel version of JT Fax Internal.

JT FAX 9600 ($795).
A 9,600-bps board with a 1,200-bps modem and coprocessor on board. Has 64K RAM, compared with 8K in the JT Fax Pro 96.

XEROX IMAGING SYSTEMS INC. (Datacopy)
1215 Terra Bella Ave.
Mountain View, CA 94043
415-965-7900
MICROFAX ($695).
A 9,600-bps board with an on-board, 1,200-bps modem and coprocessor. Controlled by disk-based software instead of a memory-resident program.

Standalone Machines

BROTHER INTERNATIONAL CORP.
FAX-150 ($1,495).
Has 20-number memory, built-in autodialer, and no advanced transmission features.

FAX-195 ($1,595).
Similar to Fax-150 but has answering machine and 50-character display to identify transmitted documents.

CANON USA INC.
1 Canon Plaza
Lake Success, NY 11042
516-488-6700
FAXPHONE 8 ($1,495).
Has a five-sheet feeder, no programmable memory, and no advanced transmission features. Can be used as a fax, phone, or photocopier.

MURATA BUSINESS SYSTEMS INC.
5560 Tennyson Parkway
Plano, TX 75024
214-403-3300
M1200 ($895.95).
Entry-level machine with polling capability. Maintains and prints out activity journal for monitoring use.

M1550 ($1,399.95).
Has 30-number autodialer and 32-character display showing instructions. Like the M1200, it maintains an activity journal.

SHARP ELECTRONICS CORP.
Sharp Plaza
Mahwah, NJ 07430-2135
201-529-8948
UX-50 ($1,399).
Can transmit in fine mode. Has no programmable memory and no advanced transmission features. Sharp's entry-level fax machine.

FO-220 ($1,595).
Has a built-in autodialer, a sheet feeder, relay broadcasting, and confidential transmission.

$1,000 boards come with this type of software, but some more expensive boards do.

Incoming faxes announce themselves with a brief on-screen message and then freeze up your computer while they write to the hard disk. Most fax boards that promise background operation merely remain active to detect transmitted faxes. They don't perform all their tasks unobtrusively. When shopping around, it's a good idea to ask if a board has an on-board coprocessor and *true* background operation.

Scanning is a subdiscipline of its own, one that is probably too esoteric and expensive for the average home-office user. "Fax really is a quick and dirty medium," says John Dyer-Bennet of Everex, adding that few of his customers use it as a replacement for standalone machines. Cheap hand scanners, such as The Complete PC's Complete Hand Scanner ($249) and Logitech's Scan Man ($299) are good for scanning in letterheads and logos if your board has graphics-merging functions. But full-page scanners cost over $1,000; add that to the $400–$1,500 board price and you're spending $2,000 to do what a discounted standalone machine can do for $1,000.

You can't treat a fax board as if it were truly a fax machine unless you leave your computer on 24 hours a day. Many users do this as a matter of course, but if you aren't in the habit, it may require some attitudinal adjustment.

LOOK BEFORE YOU LEAP

Before you buy a standalone fax machine or a fax board, make sure you understand the difference between "traditional" fax and the new communication style that characterizes PC-based fax. If you want to be able to scan in lengthy company reports and other printed material from your desk, just like you do now in the mailroom, then go for one of the less expensive standalones. Sharp is the market leader. Its $1,595 FO-220, the second least expensive machine in an 11-model line, has a full-size sheet feeder, built-in phone with 32- ►

Greasing the Wheels of Commerce

FAX BOARDS ARE having a big impact on the way businesses—large and small—communicate with customers. Nothing proves the point better than the enthusiastic testimonials you hear from hard-core PC fax users. Here's a small sampling.

While You Were Out

Dennis Miller, a Northeastern University music professor, uses a Brooktrout board in his Wellesley, Mass., home. Miller's fax is the hub of his side business—selling compact discs for a Los Angeles company. As Miller makes calls at local music stores, his other clients can leave fax messages instead of playing phone tag. When Miller arrives home, he can type in an order form and fax it to Los Angeles immediately. (The old system required mailing the orders cross-country, which could take five days.) Miller keeps his customers happy while managing his own time effectively. "I don't leave phone messages for people anymore," he laughs. "I leave faxes."

Made to Order

Cynthia Campbell, owner of a stereo and VCR repair service in Berkeley, Calif., says her Everfax EF-12/48 takes the drudgery out of ordering parts. "Parts ordering is the biggest hassle of repairing anything," Campbell says. Now, instead of juggling phone calls to parts suppliers, she can type in orders on the computer and leave faxes. "The fax has streamlined this business in a totally unexpected way," Campbell says.

Legal Fax

The ability of fax boards to automate documents that would normally circulate on paper has given Paul Connell's corporate law practice in Atlanta a competitive edge. Three of the firm's 12 lawyers have AST Premium 286s equipped with Quadram's JT Fax Internal. One recent week, the firm was rushing to close a $50 million Eurodollar deal that it coordinated with its London office. Under the old system, lawyers would have sent a flood of documents to a standalone fax station on another floor, with no guarantee that they'd be transmitted on time. "Now, we're able to just send it directly off our PCs to London," Connell says.

Tote That Barge

Intel Connection Coprocessors help Gary Fortmann's Memphis-based marine communications company gather vital data for commercial towing companies that navigate the Mississippi River and other waterways in the eastern United States. At 3:30 every morning, dozens of barges call the WJG Maritel Corp. with information about their contents and movement. The data is used to coordinate the buying and selling of each barge's contents, a process that can occur seven or eight times on the trip from North Dakota to Louisiana. The fax boards also gather weather forecasts and phone billing information.

number memory, and some of the advanced transmission features usually found only in more expensive machines, including polling and delayed transmission. (If it has polling capability, the machine can successively poll other devices as to whether they have a document to send. It can then receive the faxes in an orderly fashion, rather than send a busy signal to several devices that are trying to transmit at the same time.) Canon, Brother, and Murata all have machines with street prices considerably less than $1,000. You'll discover that the cheapest standalones usually lack three features found in their more expensive counterparts: a paper cutter, a multisheet feeder, and advanced phone capabilities.

If you decide that you can live without hard-copy scanning, and you're ready to tap into your computer's power, take a look at what the fax board market has to offer. The Complete PC and Quadram dominate the low-price end. The Complete Fax ($399) transmits at only 4,800 bps, as does Quadram's JT Fax Internal ($295), but both boards are adequate entry points into desktop computer fax. Some advanced features have begun to show up in the mid-price range. Brooktrout's Faxmail 96 ($499) runs at 9,600 bps and has a 2,400-bps modem. The Complete PC and Quadram also introduced similar mid-range boards. But you'll have to spend more to get all the advanced features such as polling, on-board modems, and true background operation. Dest Corp.'s $995 Facsimile Pac, Panasonic Industrial Co.'s $999 FX-BM89+ Fax Partner, Xerox Imaging System Inc.'s $695 Microfax, and Quadram's $795 JT Fax 9600 all perform unobtrusively in the background.

If you do decide to take the plunge and buy a fax board, you could get hooked on the convenience it provides. I recently interviewed several users, all of whom reported that fax boards have become indispensable tools in their businesses (see the sidebar "Greasing the Wheels of Commerce"). Fax may not change your life, but it could revolutionize the way you work. ◆

DAVID ESSEX *is the senior writer for* PC Resource. *Write to him at 80 Elm St., Peterborough, NH 03458.*

Find the Perfect Word Processor

WOULDN'T LIFE BE SIMPLER if, as in politics, one word processor could be all things to all people? For corporate office workers, it would handle any printer ever made, generate complex graphs, and automate mailings. Professional report writers and researchers would appreciate its spelling and grammar checker, which would not only recognize doubled words and abbreviations, but also suggest appropriate ways to vary syntax and clarify meaning. Casual users would find the command structure simple to operate and easy to memorize. The entire RAM-resident program would fit on a single floppy disk and sell for less than $50.

DON'T BE SEDUCED BY MERE LOOKS. IF YOU WANT A WORD PROCESSOR THAT WILL LAST A LIFETIME, SHOP FOR ONE THAT FITS YOUR WORK STYLE.

Life is seldom so uncomplicated, of course, and shopping for a word processor is no exception. Far from dictating a universal approach, today's word processor market overwhelms us with individual choices. Faced with this complexity, it's easy to be lured into an inappropriate purchase on the basis of superficial looks or advertising claims.

I'll help you avoid that trap by outlining some meaningful buying criteria for three broadly defined user groups: the casual writer of memos and letters, the professional researcher or report writer, and the corporate office worker. Within each group, I'll suggest at least one good, inexpensive word processor from the more than 30 I've tested. These guidelines and recommendations should make stalking the wild word processor a trifle easier—and more likely to produce satisfactory results. ►

by Barry Brenesal

Home Users

YOU DON'T DO illustrated reports, legal briefs, or public relations presentations. Your primary reason for wanting a word processor is to convert your computer into a high-speed typewriter that lets you change text without using correction tape. Why search for more? But you may, under commercial pressure, buy the word processing equivalent of a Maserati that you'll use for nothing more than weekly trips to the local grocery.

If you want to feed your computer a steady diet of personal memos, letters, and sundry lists, then start by considering a small package that fits on one or two floppy disks. If your home computer lacks a hard disk or extra RAM, you shouldn't be forced to upgrade just to suit a finicky word processor.

You'll also want a program with commands that are easy to remember and type. Good help screens are vital, especially if you haven't been exposed to more complex programs at work. The documentation should be clear without being condescending. Features should include a spellchecker that can peruse an entire file for errors and suggest replacements. Finally, the software should be inexpensive. Unless you have plans to set up a home business, you needn't plan to spend more than $70; in fact, as the low-end choice in this category shows, you can do very well for under $50.

UNLESS YOU PLAN TO START A BUSINESS, YOU NEEDN'T SPEND MORE THAN $70 FOR A HOME WORD PROCESSOR.

TEXTRA 5.2: GOOD BEGINNINGS

Few word processors in the home-use category have stood up better to the test of time than Ann Arbor Software's Textra 5.2. An extremely friendly word processor under any circumstances, Textra 5.2 is possibly the best choice of all for first-time buyers.

Among Textra's attributes is its what-you-see-is-what-you-get (WYSIWYG) work screen, which clearly displays the program's function-key command options along the bottom. In page-preview mode, you can view a "snapshot" of how your text will look when printed, sheet by sheet. The program lets you view as many as six snapshots on screen simultaneously.

Textra can display headers and footers, perform complex search-and-replace operations, and reformat entire documents as you edit. File size is limited to 60,000 characters, or about 30 pages, but this shouldn't be a problem for casual applications. After all, how many

ILLUSTRATED BY GLENN DAVIS

times do you write a 30-page shopping list?

The program includes a 75,000-word dictionary and spellchecker that you can set to automatically correct misspelled words without prior approval. It also finds doubled words (*the the*) and will ignore both designated nonwords and single characters. An on-line style guide provides instant advice concerning punctuation, grammar, abbreviations, and other common linguistic pitfalls. First-time users will appreciate Textra's thorough help screens and documentation.

Textra 5.2 supports nearly every dot-matrix, daisywheel, and laser printer ever made. In the unlikely event you have a printer that the program doesn't support, Ann Arbor Software will write a driver for it, providing you lend the company your printer documentation for a week.

For $69.95, Textra is an incredible bargain that should ease the way for any newcomer to word processing. Ann Arbor Software even offers a free, 60-day trial period to give new users plenty of time to decide if they like the product (call 800-345-6777 for information). If you seek simplicity and power at an affordable price, this package can deliver.

My Word! 2.2: Shades of Wordstar

If you've already cut your word processing teeth on Wordstar, you might be interested in the approach taken by My Word! 2.2. This package from TNT Software Inc. offers most of the best-known features of Wordstar for a mere $49.

My Word!'s command structure, like Wordstar's, places all movement and delete commands directly under your left hand, facilitating quick entry. Every other command you might require is available in easy-to-remember Ctrl-key combinations.

The package has some nice additions that go beyond what you'd normally expect to find in a home-user package, including conditional logic searches, sorting, numeric calculations from within the program (you don't have to exit to a pop-up utility), and row and column addition. It also offers an excellent mail-merge feature.

Unlike Textra, My Word! can handle very large files—up to 33,000 lines, or about 600 pages. (Letter writers with ambition, take note.) The program documentation is thorough and comes with a quick-reference card that is more readable than many included with high-end packages.

My Word! takes up very little disk space even with its 55,000-word dictionary and spellchecker. After you print the documentation and delete it from the program, you're left with about 300K in the core program, enough to fit easily on one floppy disk.

Between them, Textra 5.2 and My Word! 2.2 offer the home user two excellent alternatives to some of the more well-known commercial packages that retail for hundreds of dollars more. Both leave you with more than enough pocket change to afford printer ribbons.

Report Writer & Researchers

TO A CASUAL user, a computer may be convenient hardware, but to you, it's a vital organ. The old idea of having to retype two dozen pages because a few footnotes were omitted understandably fills you with holy dread. You relish high-end word processing features that make your life simpler and your work's appearance more professional—features like extensive printer support, windows for viewing and copying, and easy generation of footnotes, indexes, bibliographies, and tables of contents. You may want specialized dictionaries, depending upon your profession, and you probably depend on a good, on-line thesaurus.

Such a program is going to be quite large, but then so are your requirements. Chances are, your computer is equipped with a hard disk that can hold a word processor in excess of 1MB, right alongside that book or report that will one day bring you fame and glory.

PC-Write 3.0: The Best in Shareware

PC-Write is a shareware program with features that rival those of many high-end commercial packages. Want to generate style instructions that you can summon with a single command? Need to instantly reconfigure files? PC-Write can do this easily and without the $495 price tag of Word Perfect or Xywrite. For an initial investment of $19, the price of downloading the program or buying the three program disks directly from Quicksoft, you get multiple fonts, bookmarks, multiple undelete levels, index sorting, and footnoting. A macro system, usually found in programs more than 20 times the price, lets you define a series of functions through your choice of one- and two-key commands. The program even handles a mouse. PC-Write 3.0 is one very powerful word processor and a remarkable bargain, even after you pay the full registration price of $99 and receive the manual and technical support.

The program's value is even more apparent when you examine ►

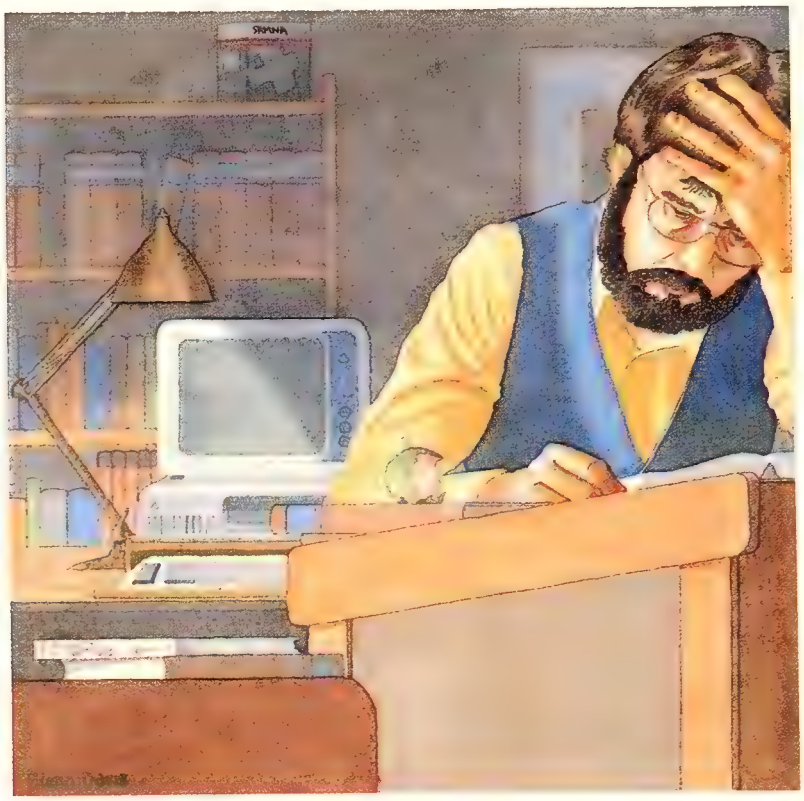
the competition: Challengers in this category are few and lightweight. Simon & Schuster Software's Webster's New World Writer I justifies its name with a whopping 114,000-word dictionary and excellent thesaurus, but it doesn't include windows, macros, footnoting, indexes, or tables of contents. Tandy Corp.'s Varsity Scripsit gives you footnotes, tables of contents, and macros, but it offers no index generation, DOS access, or ability to do simple calculations.

PC-Write does have a catch to it, however. As the program has grown over the years, its developer, Quicksoft Inc., never looked back. It simply kept adding features to the core program without rethinking the command structure or the documentation. The resulting construct is endless and fascinating, but ultimately confusing. The on-screen help, for example, is exhaustive, but it consumes full-view, rather than the once-favored partial windows. Consequently, you can't easily read the instructions and follow them at the same time.

Fortunately, Quicksoft has realized the problem and promises a complete manual revision by 1990. In the meantime, help is available from Wink Data Products (5631 208th St. S.W., Lynnwood, WA 98036), which produces a levered template that alphabetically lists all PC-Write commands and color codes them by function. If you have a modem, assistance is also available from a host of bulletin board systems that have message centers devoted to PC-Write.

Samna Plus IV: High-End Distinction

Few word processors offer more than PC-Write, no matter what the price. One that does—for a hefty $695—is Samna Corp.'s Samna Plus IV. Its command structure boasts a clarity and simplicity that, among high-end programs, is second only to Borland's Sprint. Typical is the matter of switching



IF YOU WRITE PROFESSIONAL REPORTS, YOUR IDEAL WORD PROCESSOR IS LIKELY TO BE QUITE LARGE—BUT THEN SO ARE YOUR REQUIREMENTS.

to alternate foreign-language keyboards, of which the program has 12, including Spanish, French, and Scandinavian. To select an alternate layout, you simply press F5, K, and then input a number from 1 to 12. The ring binder contains 12 corresponding keyboard diagrams that you can remove for reference. In addition, the English-language cards provide a quick check of Samna's editing and function commands.

Samna supplies the serious researcher with myriad tools, including an outline generator; multicolumn label-making capability; full-page preview with zoom mode; and an elaborate, integrat spreadsheet. The program also a red-lining feature, which le print or view a docume deletions and additio lighted. A thesaurus fur initions, synonyms, an related words. A text tion searches direc disks at a single r

Samna Plus I only fair (they useful funct

rus), but the disk-resident tutorial is well done, and its written documentation—unlike that of its close competitor, Dragonfly Software's Nota Bene—is clear and thorough enough to set an industry standard. All in all, Samna is the word processor of choice for researchers who demand the best.

Office Workers

IF YOU WORK in a corporate office, management's credo "Time is money" may have its on-the-job corollary in "Hit the ground running and pray you don't jog over a cliff." In this case, you don't want a word processor that puts obstacles in your path. Unfortunately, your company's purchasing agent may not see things from that perspective. Rather than seek out the gem that will get you up and running quickly, many software buyers fall victim to the "do-everything" promises of larger, more complex packages. Ultimately, these products can frustrate both you and your management because of the substantial study required to perform even simple operations.

Software buyers for busy offices should have in mind three rules when choosing a word processor. The package should be easy to learn, employ simple commands, and reward greater investigation over time with more complex functions. This puts a considerable burden on the documentation, which must have a good quick-start section and strong reference materials. The finished document will have to be extremely professional, and that requires a program that supports laser printers and a wide spectrum of fonts. If you use graphics, the ability to create columns is a must. An effective mail-merge system is also a must.

Unless your needs call for desktop publishing capability, you shouldn't have to spend more than $200 for an office word processor. In the under-$200 category, my recommendations are split among Software Publishing Corp.'s Professional Write, Symantec's Q&A Write, and Timeworks' Beyond Word Writer. For larger corporate environments, Borland International's Sprint wins top honors.

Professional Write, Q&A Write, and Beyond Word Writer: An Office Triangle

Software Publishing introduced Professional Write in August 1986. Feature-laden and filled with pop-up menus that almost made written documentation superfluous, the program was an instant success. Then, in 1988, Symantec premiered Q&A Write, which bore a striking resemblance to Professional Write. Both offered Laserjet support, excellent documentation, wildcard searches, and many other identical refinements. Software Publishing screamed "foul," and the battle was on.

In subsequent upgrades, Software Publishing and Symantec tried to outdo each other by adding features. First, Q&A Write provided DOS access, up to 18 lines for headers and footers, and linked columns that let you snake text around graphics. Professional Write fired back with searches through multiple files, password protection, and a memory-resident thesaurus.

Then, earlier this year, Timeworks unveiled Beyond Word Writer, and it looked startlingly like both Professional Write and Q&A Write. But while Q&A Write can read files written by a few other, more elaborate word processors such as Wordstar and Word Perfect, and Professional Write can both read *and* write to files created by these other programs, Beyond Word Writer goes a step further: It can reconfigure its user interface to generally resemble those other programs.

Unfortunately, Beyond Word Writer has some serious documentation problems, even though the help screens are excellent. The index is scanty, and the language seems intended for 10-year-olds. The reference portion of the manual is slightly better, although it omits a good deal of information.

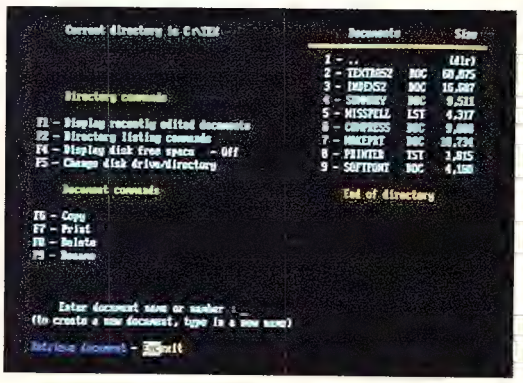
That aside, all three programs represent a good investment, and it's impossible to lose with any of them. Professional Write has recently developed another upgrade, Version 2.1, which adds a page-preview feature. This gives Software Publishing the current edge, in my opinion, but I doubt we've heard the last word yet from either Symantec or Timeworks.

Sprint: High-End Power Without the Price

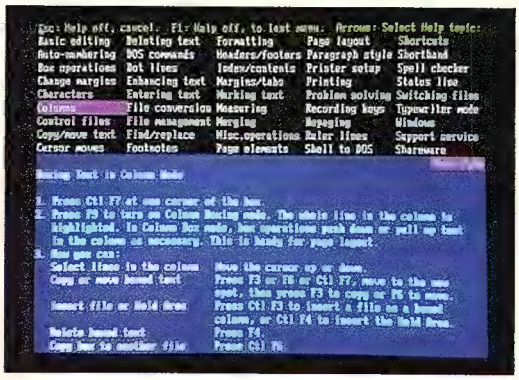
If your business tasks are technical, you'll find an army of corporate word processors prepared to tackle the job. Xyquest Inc.'s Xywrite is a favorite among editors, Microsystems Engineering Corp.'s Mass-11 really has no equal for scientific writing, and Microsoft Word rules the desktop market, at least until Samna Corp.'s Ami Professional gains some name recognition. But for routine office work, Borland's Sprint is hard to beat.

Sprint combines easy handling with an impressive level of word processing sophistication. You can, for instance, open 24 files and display them in windows simultaneously. The program has a com- ►

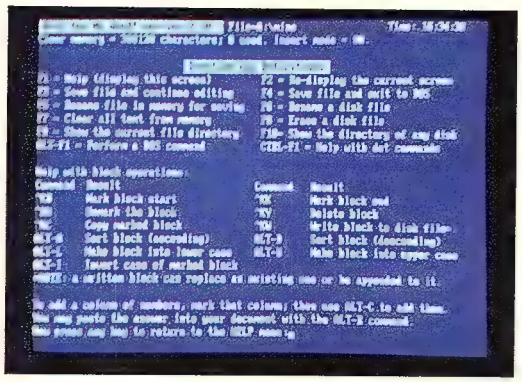
Features	HOME USERS		REPORT WRITERS	
	TEXTRA 5.2 Ann Arbor Software 345 S. Division Ann Arbor, MI 48104 313-769-9088	MY WORD! 2.2 TNT Software Inc. 34069 Hainesville Road Round Lake, IL 60073 312-223-8595	PC-WRITE 3.0 Quicksoft Inc. 219 First Ave. N., #224 Seattle, WA 98109 206-282-0452	SAMNA PLUS IV Samna Corp. 5600 Glenridge Drive Atlanta, GA 30342 404-256-2272
ASCII file saves	Yes	Yes	Yes	Yes
Automatic correction	Yes	No	No	No
Calculator	No	Yes	Yes	Yes
Columns	No	No	Parallel	Yes
Creates style files	No	No	Yes	No
DOS access	Yes	Yes	Yes	Yes
Footers/headers	Yes	Yes	Yes	Yes
Footnotes	No	No	Yes	Yes
Foreign keyboards	No	No	No	Yes
Hard disk required	No	No	No	Yes
Hyphenation	Yes	No	Yes	Yes
Index/table of contents	No	No	Yes	Yes
Macros	No	Yes	Yes	Yes
Mailmerge	No	Yes	Yes	Yes
Maximum file size	60K	RAM	640K	RAM
Page preview	Yes	No	No	Yes
Price	$69.95	$49	$19 trial, $99 fully registered	$695
Proportional spacing	No	Yes	Yes	Yes
RAM requirement (minimum)	256K	256K	256K	512K
Searches across files	No	No	No	Yes
Spellchecker	Yes	Yes	Yes	Yes
Suggests corrections	Yes	No	Yes	Yes
Thesaurus	No	No	Add-on	Yes
Windows	No	No	2	2
Word count	Yes	Yes	Yes	Yes
Words in dictionary	75,000	55,000	50,000	80,000
Zoom mode	No	No	No	Yes



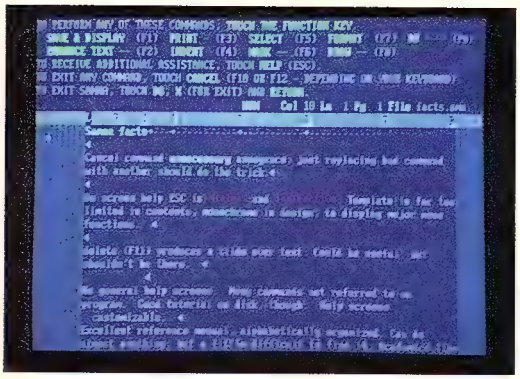
◄ TEXTRA 5.2, with its clear help screens and function-key commands, is a good choice for new users.



► PC-WRITE 3.0 offers exhaustive on-screen help, but it consumes the whole screen.

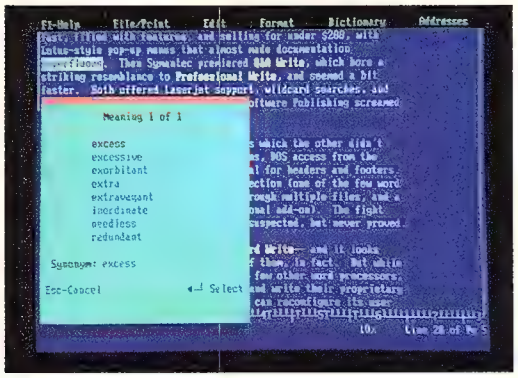


◄ MY WORD! 2.2 places all movement and delete commands under your left hand.

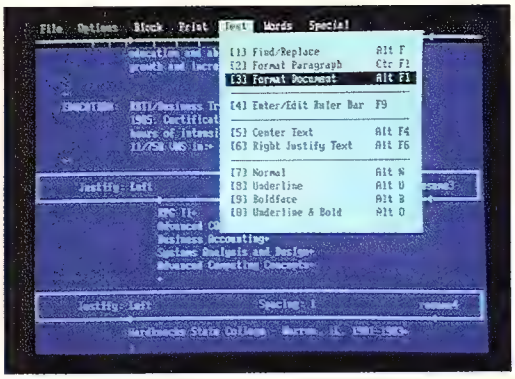


► SAMNA PLUS IV's help screens are rather terse, but the disk-resident tutorial compensates.

CORPORATE OFFICE WORKERS			
PROFESSIONAL WRITE 2.1 Software Publishing Corp. 1901 Landings Drive P.O. Box 7210 Mountain View, CA 94039-7210 415-962-8910	**Q&A WRITE** Symantec Corp. 10201 Torre Ave. Cupertino, CA 95014-2132 800-441-7234 (800-626-8847 inside Calif.)	**BEYOND WORD WRITER** Timeworks Inc. 444 Lake Cook Road Deerfield, IL 60015-4919 312-948-9202	**SPRINT 1.0** Borland International Inc. P.O Box 660001 Scotts Valley, CA 95066-0001 408-438-8400
Yes	Yes	Yes	Yes
No	No	No	No
Yes	Yes	Yes	Yes
Linked	No	Linked/Parallel	Linked
No	No	No	Yes
No	No	Yes	Yes
Yes	Yes	Yes	Yes
No	No	Yes	Yes
No	No	No	No
No	No (A hard disk is recommended)	No	No
No	Yes	Yes	Yes
No	No	Yes	Yes
Yes	No	No	Yes
Yes	Yes	Yes	Yes
640K	64K	200K	Unlimited
Yes	Yes	No	No
$229	$199	$199.95	$199.95
Yes	Yes	Yes	Yes
384K (512K RAM is recommended)	512K	512K	384K
Yes	Yes	No	No
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
No	No	Yes	Yes
Yes	Yes	Yes	Yes
77,000	77,000	100,000	100,000
Yes	No	No	No

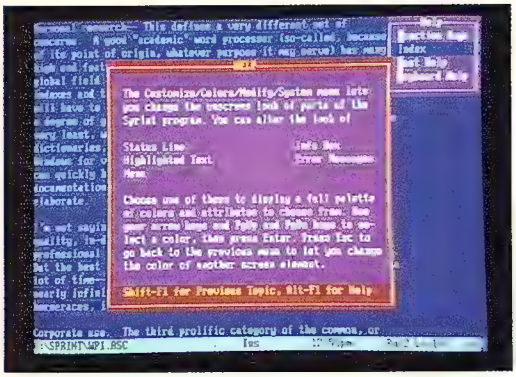


◄ **PROFESSIONAL WRITE 2.0** is laden with excellent features, including an on-line thesaurus.



► **BEYOND WORD WRITER** has excellent help screens, but the written documentation needs improving.

◄ **Q&A WRITE** lets you format text with headers, footers, centered lines, and columns.



► **SPRINT 1.0** combines easy handling with an impressive level of word processing sophistication.

plex macro language, as well as a "potpourri" of 48 miscellaneous functions to which you can give special key assignments. These, plus more standard features are thoroughly explained in the 375-page *User's Guide*.

Another of Sprint's strong suits is its chameleon interface, which can be reconfigured into almost exact clones of Word Perfect, Sidekick, Wordstar, and Microsoft Word. Sprint also reads and writes in Multimate, Wang, Displaywrite, and simple ASCII file formats. This means an office worker could turn Sprint into a Word Perfect clone, edit a Multimate file, and give it to a Wordstar user to be quickly translated through Sprint's Wordstar interface. Problems with word processing incompatibility are virtually eliminated.

Borland's own user interface is superb, combining good help menus with three ways to access any command: via simple key combinations, by moving a highlighted bar in a pull-down window, or by typing the first letter of the command. The program always displays the appropriate key combination when you select one of the other methods for accessing a command.

BUSY OFFICES REQUIRE A PROGRAM THAT'S EASY TO LEARN AND HIGHLY FUNCTIONAL.

Given Sprint's unique capabilities, it's a pity several weaknesses weren't removed before the first release last year. The 100,000-word dictionary spell checks very well, but it moves at a glacial pace. Both Wordstar 5.0 and Samna Plus IV, hardly speed demons, proofed a 6,000-word document in 39 percent of the time Sprint managed.

Allowing for the program's notable support of printers, formatting, and style functions, it's ironic that it lacks an overall page preview. There is a screen preview for you to scroll through, but it can't demonstrate alternate fonts. These drawbacks, however, do not substantially detract from Sprint's overall usefulness. Borland promises a new version of the program in about a year, but in the meantime, Sprint's outstanding ease of use, low learning curve, and versatility make it an excellent choice for any business pool.

Some Final Points

Strong technical phone support and easy installation have become standard in the word processing field and are certainly among the strong points of all the packages mentioned here. That said, let me offer one more piece of sage advice for you to weigh: Before buying a word processor, try out some programs at your local computer store. Often, your hands-on impressions will be more telling than any reviewer's evaluation or tally of features. Combine your impressions with the information you've already gathered, and you should find yourself a perfect word processing match. ◆

BARRY BRENESAL *has been reviewing computer software since 1982 for magazines, radio, and TV. Write to him c/o* PC Resource, *80 Elm St., Peterborough, NH 03458.*

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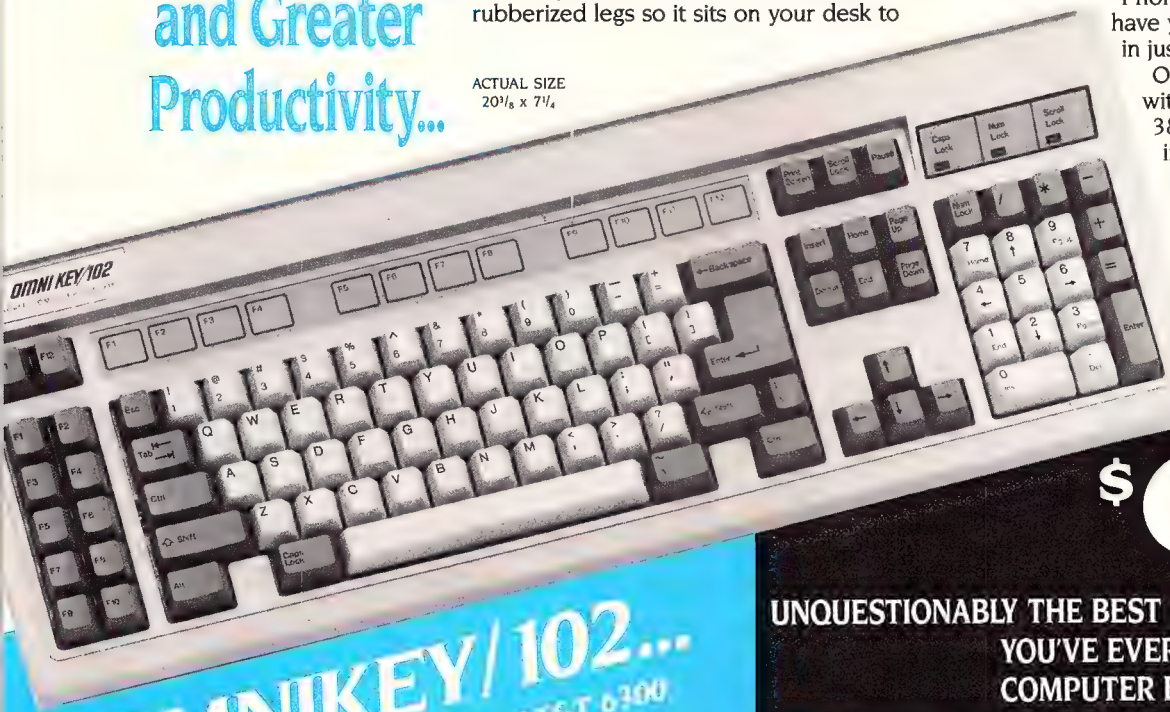

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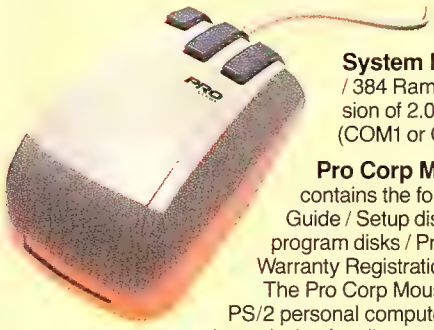

System Requirements:
/ 384 Ram minimum / 1 floppy disk drive / A DOS version of 2.0 or later Serial version requires a serial port (COM1 or COM2) BUS version requires a BUS card.

Pro Corp Mouse Package:
contains the following: / Pro Corp Mouse / Setup & User's Guide / Setup disk & drivers / Pro Corp Mouse Dr. Halo III program disks / Pro Corp Mouse Dr. Halo III manual / Warranty Registration Card / 9-25 pin adapter (for serial version). The Pro Corp Mouse is designed for IBM PC, PC/XT, PC/AT, PS/2 personal computers and compatibles. It is an outstanding input device for all uses.

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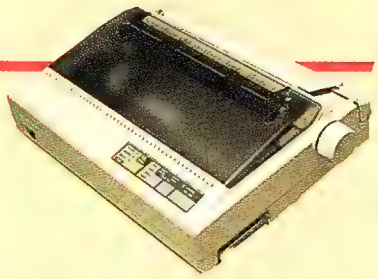

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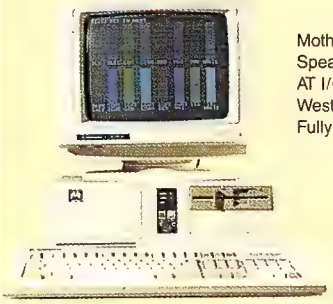

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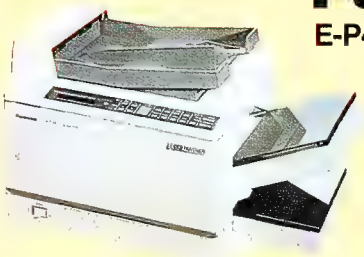

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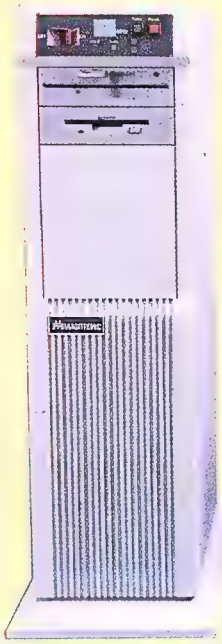

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Make your POP-up

ONE OF THE most acrobatic performers in the personal computer ring is the pop-up utility, that little gem whose technical name is terminate-and-stay-resident (TSR) program. In 1984, Borland International introduced Sidekick, the first commercial TSR program, and PC users have been fans ever since. Today, there are more than 150 commercial TSR programs vying for a place in your computer's RAM. You may already own an assortment of TSRs for such tasks as popping up spreadsheets, speeding up cursor movement, printing envelopes, or performing quick on-screen calculations.

That TSRs have become something of an addiction for PC users is easy to understand. TSRs let you add functions to the underlying software you use to make your computer productive. They let you perform a new task without leaving your current application, and they offer a layer of insulation between you and the sometimes murky MS-DOS.

But as with a circus act, software performances can be hurt by too many acrobats in the ring. If you use a lot of TSRs, you may have already experienced some mishaps. The symptoms are fairly classic: You tap the keys to call a TSR, but the wrong function appears on screen. Or, you tap the keys and nothing happens; or, worse yet, you tap the keys and your computer visits never-never land, forcing you to reboot and start your computing session over.

Because TSRs are useful but sometimes dangerous, you need to know how to use them effectively while avoiding the problems they create. And since knowledge is the best route to competence in the MS-DOS world, I'll lead you to some practical solutions by clarifying how TSRs work. In the process, you'll learn what TSR code consists of, how TSR programs interact with MS-DOS and your other applications, and what it is in their behavior that sometimes incites conflict. In the sidebar, "Rules of the TSR Game," I'll translate this knowledge of TSRs into a few simple rules for TSR management. I'll also look at some commercial solutions to the "TSR problem" and explain how tomorrow's operating system software might make TSR conflicts a thing of the past.

by G. Michael Vose

Anatomy of a TSR

Terminate-and-stay-resident programs get their name from their ability to run once, stop, and remain in RAM until called upon again. To do this, TSRs use two crucial parts of MS-DOS. One part, the MS-DOS service invoked with the software interrupt 21 hexadecimal (INT 21H), function 31H, lets a program finish running and relinquish its control of the computer but stay in memory. The other part, MS-DOS's interrupt-processing capability, halts the running of one program and passes control of the computer to another. Since interrupts play a major role in the function of a TSR, let's take a minute to examine what they are and how they operate.

Modern microprocessors use an *interrupt-driven architecture*. In an interrupt-driven architecture, the processor's execution of a program can be interrupted by some outside event, like a tick of the system clock. Microprocessors in the Intel 80x86 family use two kinds of interrupts: hard and soft. A hardware device attached to a special pin on the microprocessor causes a *hard interrupt*. The INT assembly language instruction causes a *soft interrupt*. Because of how they originate, a hard interrupt is commonly called a *hardware interrupt*, and a soft interrupt is commonly called a *software interrupt*.

When an interrupt occurs, the CPU executes an *interrupt-service routine*, also called an *interrupt handler*. The CPU halts the current program, saves the address of the current program's next instruction, and jumps to the address of ►

programs behave

Find out why memory-resident utilities sometimes clash and how you can keep them performing on cue.

ILLUSTRATED BY JEFF MOORES

the routine that processes the interrupt. The code for the interrupt-service routines are usually located in the *interrupt-vector table*, which loads into the first 1,024 bytes of RAM when you boot the system.

Interrupts aren't the exclusive province of TSRs, but their use is what lets you call a TSR by pressing hot keys. To see how this works in practice, let's trace the operation of a typical TSR program.

Getting into Memory

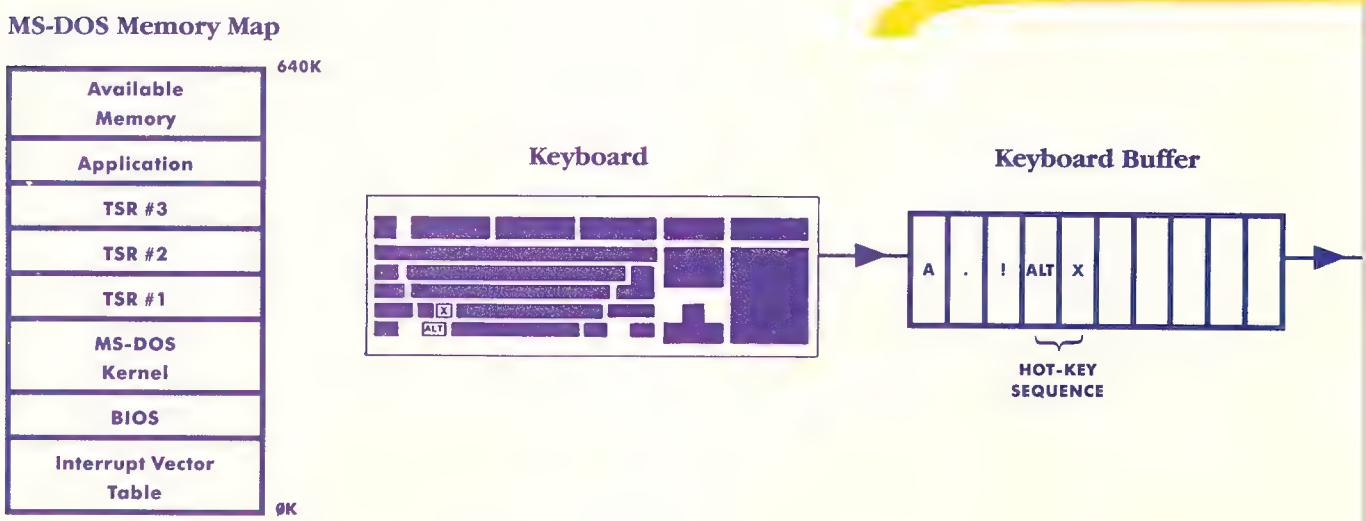
Memory-resident programs are like any other MS-DOS application program. As executable files, they reside on disk as either .EXE or .COM files, although most are of the latter type. The main difference between a .COM and .EXE file is size: .COM files are generally less than 65,536 bytes, the segment size of an Intel 80x86 microprocessor.

To load a TSR into memory, you simply type its filename at the MS-DOS system prompt or use a batch file to tell the MS-DOS command interpreter, COMMAND.COM, to load and run the program. With the TSR tucked safely into memory, you can load and run other applications as you normally would. MS-DOS places these additional programs into whatever memory is left over after your TSRs load. The more TSRs you use, the less memory you have for spreadsheets, databases, or whatever applications you normally run.

When first loaded, a TSR runs a series of instructions called an *initialization sequence*, which prepares it for action. As part of this sequence, a TSR often will replace the address of MS-DOS's keyboard handler with the address of its own keyboard handler. This can be done in one of two ways: A TSR can simply write a new address at the appropriate place in the interrupt-vector table, or it can call INT 21H, function 25H. The latter is the well-behaved method because it guarantees that MS-DOS will safely replace the vector and prevent interrupts from occurring while the replacement is in progress. If a TSR replaces a keyboard interrupt vector directly and fails to take proper precautions, a keyboard interrupt occurring during the replacement operation could crash the system.

Replacing the MS-DOS keyboard handler with its own

How a TSR SHOULD Perform



STEP 1. LOADING. To visualize how TSRs work together, imagine that you have loaded three pop-up programs into memory. In this case, TSR#3, the last one loaded, becomes the first TSR in the interrupt-handling chain.

STEP 2. INTERRUPT SENT. Next, you press the hot-key sequence—say, Alt-X—for TSR#2, which initiates an interrupt. Since TSR#3 is the last utility in memory, the address for its keyboard-handling routine will be the current one in the interrupt-vector table and the first handler to examine the key code you just pressed.

STEP 3. TSR#3 READS KEY CODE. TSR#3 now looks at the key code, which the keyboard has temporarily placed in a keyboard buffer. The buffer can hold up to 10 keystrokes.

allows the TSR to capture all keyboard scan codes and watch for its special hot-key sequence. When the TSR's keyboard handler detects the hot-key sequence, the TSR takes control of the computer, and the previous application becomes dormant. The TSR saves crucial information about the interrupted program in a special area of memory called the *stack* and then goes about its job. When the TSR finishes, it cleans up after itself by restoring the display, if necessary, and pulling the information it stored about the previous program off the stack. A special return-from-interrupt instruction—IRET—tells the CPU to go back to the program it was previously running.

If the TSR's keyboard handler does not detect its hot-key scan codes, it simply passes those codes to the original MS-DOS keyboard handler. This process is called *interrupt-handler chaining* and is critical to keeping the peace between TSRs and application programs.

If you think of TSRs only as programs that run separately from the operating system, you may be surprised to learn that MS-DOS contains several internal TSRs of its own. PRINT.COM, for example, is a TSR that performs background printing. By disassembling the code for routines like PRINT.COM, programmers first learned the techniques for writing TSRs.

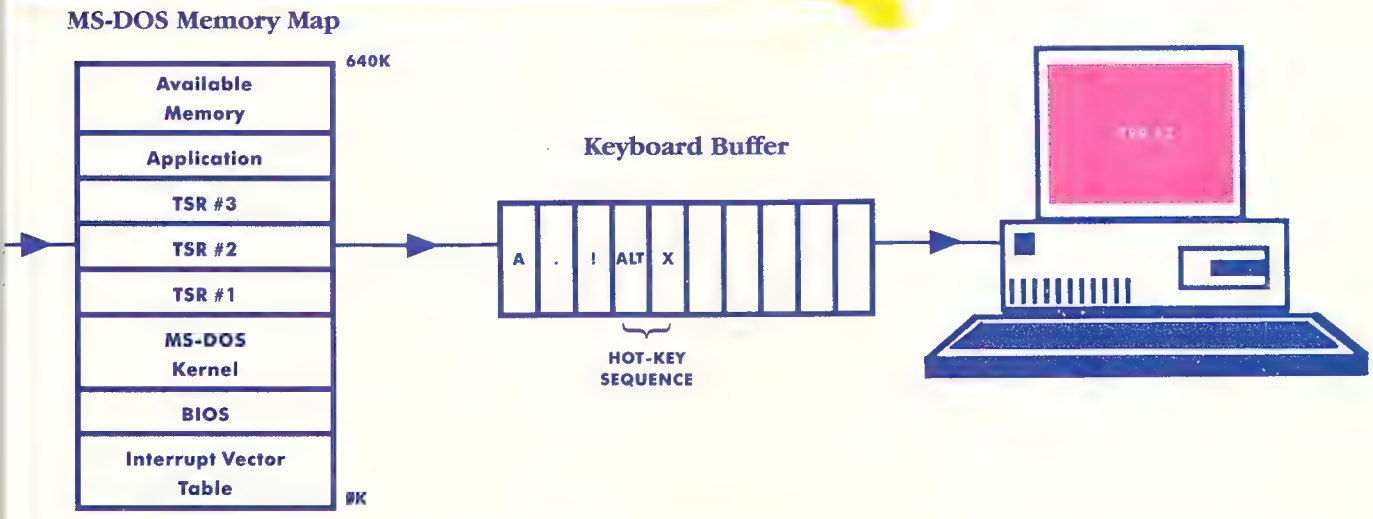
Why TSRs Conflict

To make their computers as powerful as possible, some people use several TSRs simultaneously. For example, I use a TSR that speeds up my screen cursor, a TSR for printing envelopes on my laser printer, and another TSR for its notepad, calculator, and other utilities. My computer loads all these TSRs right after bootup by reading the AUTOEXEC.BAT file, which includes the name of each TSR program as an executable command line.

All these TSRs alter the interrupt-vector table. This process is not dangerous if the TSR changes the vector table properly, by calling MS-DOS INT 21H, function 25H, so that every TSR's interrupt handler passes keyboard scan codes to the previously loaded keyboard handler.

The problem is that some TSRs replace the MS-DOS keyboard handler with their own and never pass the scan codes along the chain. Some TSR programmers ►

Interrupt-Handler Chaining



STEP 4. TSR#3 PASSES CODE. Not recognizing the hot-key code as one of its own, TRS#3 passes the code to TRS#2. This is the crucial process of interrupt-handler chaining. A TSR that fails to pass keyboard scan codes to previously loaded handlers can create a variety of conflicts, ranging from keyboard lockups to complete system crashes.

STEP 5. TSR#2 READS KEY CODE. With its keyboard-handling routine now in control, TSR#2 looks at the code stored in the keyboard buffer.

STEP 6. TSR#2 APPEARS ON SCREEN. Recognizing that its hot key has been pressed, TSR#2 breaks the interrupt-handling chain and takes control of the computer.

write keyboard handlers that mimic the function of MS-DOS's keyboard handler, as well as look for and act upon their own hot-key sequences. Because their TSR handlers provide all the functions of MS-DOS's, the programmers of these TSRs see no need to chain to other interrupt handlers. However, this assumes users will run only one TSR at a time. If TSRs fail to chain to other handlers when more than one TSR is loaded, none of the previously loaded utilities will receive keyboard codes.

The conflicts that can result from this kind of TSR behavior are easy to spot. A classic symptom is when you find you can call only one TSR—and perhaps not the one you want. This problem might result when TSRs use the same hot-key sequence. The only solution to this kind of conflict is to avoid using those specific TSRs together in the same computing session. Some TSRs let you redefine their hot keys as a fix for this problem.

Another common conflict shows up when you press a hot-key sequence and the TSR you expect to see never pops up. If you have multiple TSRs loaded, you may be seeing a conflict caused by a poorly behaved TSR that is not passing along scan codes to other interrupt handlers. Or, if no other TSRs are in memory, your current application may not allow your TSR interrupt handler to get keyboard scan codes; not all applications are well behaved, either. Many applications written before TSRs were invented saw no need to chain interrupt handlers and therefore "hog" the keyboard.

Another symptom of TSR failure is a locked up machine. This symptom usually results from overloading the internal MS-DOS stack with information about interrupt-handler redirection or other crucial system data. A stack overload can crash the machine.

Removing TSRs also can cause problems. Some utilities let you "deinstall" them, but you shouldn't do it unless the TSR in question was the last one loaded and you have no other program currently running. Deinstalling a TSR that was not the last one loaded at bootup will create a hole in memory, which triggers a memory-allocation error that crashes MS-DOS.

TSRs might work the first time they are called but fail later when an interrupt tries to call an MS-DOS service before that service has finished executing a previous request. Since MS-DOS is a nonreentrant operating system—which means it cannot begin executing a service routine a second time before finishing its first execution—this situation can cause a variety of seemingly random failures and errors.

Rules of the TSR Game

A FEW SIMPLE rules can help you get more mileage out of using TSRs, particularly if you choose not to use a TSR manager or kernel. These rules might save you a few bytes of memory and can help you avoid some potential conflicts.

RULE #1. Keep the number of TSRs you use to a minimum. Since each TSR you use occupies memory even when it is idle, adding TSRs leaves you with less memory for your regular applications.

RULE #2. If you load TSRs from an AUTOEXEC.BAT file, place the names of those TSRs before any commands, such as PATH or PROMPT, that affect the DOS environment space. Each TSR gets a copy of the environment variables specified on bootup, so building a larger environment space by adding variables will eat up more of your memory by making each TSR a little larger than it needs to be.

RULE #3. Experiment with the loading order of your TSRs if you experience conflicts.

RULE #4. Load last any TSR you expect to deinstall.

Managing TSR Upstarts

Two basic methods exist to help you tame the occasionally temperamental TSR: experiment with combinations of TSRs and applications plus different loading sequences for TSRs; or acquire a TSR manager to act as coach.

Experimenting with TSR combinations lets you discover which TSRs conflict with one another. You can start by loading two TSRs and testing both to see if they peacefully coexist. Then, add a third TSR. If trouble erupts, try loading different pairs to figure out if the clash results from two TSRs disagreeing or from a combination of the three. If the latter proves true, you may have to discard the third TSR. Also try changing the loading order of the TSRs; this simple procedure eliminates many TSR conflicts. Or, you might boot the computer with just the combinations of applications and TSRs that you know work together.

Testing TSR/application program combinations can be a tedious process. Rebooting your machine several times a day, depending on what TSRs you want to use, can be inconvenient to the point of making a specific TSR not worth the trouble. When you reach a point where you need a multitude of TSRs, you might want to consider a TSR manager. A number of such products now exist in the market; see the "Commercial Solutions" box on page 77 for manufacturers, product names, and prices. (For reviews of Extra and Ram Lord, see "How to Handle Pop-ups That Pop Off," April 1989, page 142. For a review of Pop Drop 3.1, see "Pop Your Cares Away," August 1988, page 109.)

Most commercial TSR managers work by reserving a portion of the computer's memory as a TSR space. The TSR manager then loads a specific TSR when you call for it. When you subsequently call a different TSR, the TSR manager removes the first TSR from memory and loads the newly called TSR. By swapping TSRs in and out of memory, the TSR manager prevents conflicts by simply making TSRs physically unable to interfere with each other.

TSR managers are able to determine which TSR you want by watching for that program's hot keys. To do

this. TSR managers must be TSRs themselves. To avoid conflicts with the TSRs they manage, the TSR managers are careful not to tamper with any interrupts that a client TSR might use.

A variation on the TSR manager concept, a TSR kernel, such as Borland International's Sidekick+ or Lotus Development Corp.'s Metro, provides a TSR engine that individual TSRs hook onto. The kernel processes hotkey requests and activates the appropriate TSR, bringing into memory only those TSRs that will fit; at load time, you can set the amount of memory you want to make available to TSRs. Like a TSR manager, a TSR kernel guards against conflicts by keeping an eye on interrupt-vector replacements.

One advantage of TSR managers and kernels is that you can remove a TSR from the active list at any time without requiring a computer reboot operation.

The Ultimate Solution

Because nearly every TSR you can acquire today uses a slightly different method of handling your computer's keyboard and video devices, the possibility of TSR conflicts is a near certainty. But an industry standard for dealing with a few key TSR events might let TSRs coexist in peace.

The key TSR events that standardization would benefit include interrupt chaining, video handling, and keyboard handling. Chip Rabinowitz, a programmer who's been fighting since 1986 to develop a standard for TSRs, says that giving TSR developers a standard way of writing routines to communicate with the keyboard and screen and to smoothly pass on interrupts could guarantee well-behaved TSRs for the personal computing public. Rabinowitz has even developed a library of routines, called Tesseract, to accomplish that goal.

But why hasn't the industry developed a standard for TSRs? The major stumbling block has been MS-DOS's vendor, Microsoft Corp. The company insists that TSRs are not suitable programs to run under MS-DOS. Although Microsoft provides operating system services to make TSRs possible, the company has only reluctantly documented those services. And even though they now sell two CD-ROM applications—Bookshelf and Programmer's Library—that use a TSR for searching CD-ROM disks, Microsoft still takes the position that you should avoid using TSRs.

What's more, attempts to standardize TSR behavior by companies like Borland and Lotus have been greeted with skepticism by many TSR vendors. Programmers suspect that following a standard established by another TSR vendor will put them at the mercy of that vendor, which can change the standard at whim. The vaunted Sidekick+ and Lotus Metro kernels, announced with some fanfare over two years ago, still languish with unreleased application programming interfaces (APIs), the set of programming conventions used to hook into the kernel.

The ultimate solution to the TSR dilemma may be a new operating system. OS/2, IBM's newest offering, makes TSRs obsolete in two ways: First, OS/2 is a multitasking operating system that can run many different programs simultaneously; second, OS/2 provides for the use of device monitors, programs that execute as separate entities and can watch for keyboard, disk, clock, or other signals and take action when those signals activate. These two facilities make it easy to write programs that act like TSRs without having to worry about the kinds of conflicts to which TSRs are vulnerable.

But OS/2 won't be widespread for some time yet. Meanwhile, the popularity of TSRs despite their inherent potential for conflict prescribe that we use the current crop with care. ◆

G. MICHAEL VOSE *authors the newsletter* OS Report: News and Views on OS/2. *Write to him c/o* PC Resource, *80 Elm St., Peterborough, NH 03458.*

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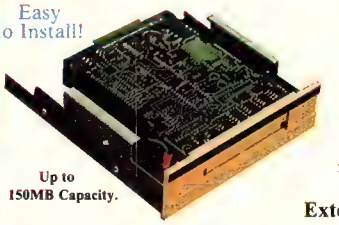

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The author, James Langdell, has written software manuals and numerous articles about personal computing. You can write to him at 1394 Bobwhite, Sunnyvale, CA 94087.

the If command, that can make the Goto command jump to a destination only under certain conditions.

▶Understanding the If Command

When used in a batch file or when entered at the system prompt, the If command must always specify a "condition" to be followed by an "action." MS-DOS will perform the action only if it finds the condition to be true. If the condition isn't true, MS-DOS will ignore the action and instead act upon the next line in the batch file.

One condition that the If command can test is whether a file does or does not exist. For example, the following command line tests if a file named MY.LOG doesn't exist in the current directory. If the MY.LOG file doesn't exist, the line instructs MS-DOS to create it by copying the contents of a file named MASTER.LOG:

```
IF NOT EXIST MY.LOG COPY MASTER.LOG MY.LOG
```

In this sample command line, "IF NOT EXIST MY.LOG" is the condition and "COPY MASTER.LOG MY.LOG" is the action.

A Goto command can be the action of an If command. You could, for example, use the following three lines in a batch file and achieve the same effect as that created by the previous sample line:

```
IF EXIST MY.LOG GOTO NOCOPY
COPY MASTER.LOG MY.LOG
:NOCOPY
```

In this case, if the MY.LOG file already exists, the Goto command will execute, pointing MS-DOS to the :NOCOPY line label and preventing it from executing the Copy command.

The If command can also test if a variable matches a specified string. The variable can be an item defined in the MS-DOS environment, such as the Path or Prompt definition or a variable that you defined with the Set command. The variable might also be a replaceable parameter from %1 through %9. These parameters represent real values that you can include on the command line when you invoke the batch file.

For example, consider a batch file named MORECOPY.BAT:

```
IF "%2"=="one" GOTO ONEONLY
IF "%2"=="ONE" GOTO ONEONLY
COPY %1 %1.1ST
COPY %1 %1.2ND
GOTO END
:ONEONLY
COPY %1 %1.1ST
:END
```


If you run this program by entering the command line:

```
MORECOPY JUNE89
```

the filename JUNE89 will be assigned to the %1 parameter. No string is assigned to the %2 parameter. Since %2 didn't contain the string "one" or "ONE," the Goto actions specified in the first two If command lines are not performed. Instead, execution passes to the third and fourth batch file lines, which make two copies, JUNE89.1ST and JUNE89.2ND, of the JUNE89 file. The fifth line causes execution to jump to the line labeled :END, so the sixth line doesn't execute.

Suppose, however, that you enter this command line:

```
MORECOPY JUNE89 ONE
```

In this case, the string value ONE will be assigned to the %2 parameter, thereby satisfying the condition specified by the If command in the second line. The Goto command in the second line will then cause MS-DOS to jump to the sixth line (labeled :ONEONLY) and execute the seventh line that follows the label.

The two If command lines are needed because the string-comparison test is case sensitive. By including the two If command lines, you can be sure the process will work as planned whether you type uppercase or lowercase letters on the command line that invokes the batch file.

To test whether a variable name has no value assigned to it, you can write an If command such as the following:

```
IF "%3"=="" GOTO REMINDER
```

Two adjacent quotation marks indicate the absence of a value.

▶Understanding the Shift Command

You may use the replaceable parameters %1 through %9 to represent up to nine values typed on the command line that invokes a batch file. The parameter %0 represents the name of the batch file program itself. (You must type at least one space between each value you include on the command line.)

Using the MS-DOS Shift command, you can reassign the command line values to different parameters in the course of a batch file program. For example, when a batch file process executes a line that says simply:

```
SHIFT
```

the value represented by the %1 parameter will be assigned to %0, the value represented by %2 will be assigned to %1, and so forth.

The Shift command can be useful in two ways. First, it can allow a batch file program to handle more than nine command line values.

For example, the first time you execute a Shift command, the 10th value you had entered on the command line will be assigned to the parameter %9.

The second and more valuable use of the Shift command lets you specify an arbitrary number of items that are handled within a repeating batch file process. The following section illustrates how you can do this by coordinating the Shift command with Goto and If.

▶Repeating a Process Involving Any Number of Items

You can use the If, Goto, and Shift commands to repeat a process until there are no more items available. The following example uses this technique to enhance a feature of the CHKDSK command.

The CHKDSK command, you may recall, lets you display information about contiguity of files. Each time you enter a CHKDSK command, you can obtain information about files in a single directory.

The following batch file named CHKMANY.BAT checks contiguity of files in as many directories as you want to specify.

```
ECHO OFF
:TRYNEXT
IF "%1"=="" GOTO ENDING
CHKDSK C:%1*.* :FIND /V "bytes"
PAUSE
SHIFT
GOTO TRYNEXT
:ENDING
ECHO All specified directories have been checked
```

After creating this batch file, you can invoke it by entering the following command line at the MS-DOS system prompt:

```
CHKMANY \ \WORDPROC\ \LETTERS\OLD\ \LETTERS\NEW\
```

The batch file instructs CHKDSK to check contiguity of files in the root directory and three other directories, display a report that focuses on the information related to contiguity, and pause before displaying a report about the next directory.

This sample batch file performs the same task that a single For command accomplished in the CHECK4.BAT batch file, which was described in the last DOS Insert installment (BP5–BP8). When you run the CHECK4.BAT program, however, you need to specify exactly four directories every time. The more sophisticated CHKMANY.BAT program lets you test any number of directories at a time.

▶Repeating a Process Within a Batch File

One advantage of batch files is that you can write a sequence of commands to perform a process and then make repeated use of your work by simply typing the batch file's name. You can, in addition, repeat a process within a single batch file by using special batch processing commands. This month, you'll learn how make a group of command lines execute repeatedly by creating control structures involving the Goto, If, and Shift batch processing commands.

▶Understanding the Goto Command

When used in a batch file program, the Goto command tells MS-DOS to jump to a specific line in the file rather than proceed to the next line. You specify the destination by including the name of a "label line" within the Goto command. The label line itself is where you want execution to continue; it contains only the label name (a string of characters with no spaces between them) preceded by a colon. For example, the label line:

```
:NOWHERE
```

would be the destination for a Goto command written as:

```
GOTO NOWHERE
```

Within a batch file program, a label line can come before or after the Goto command line that leads to it.

Each label line must have a unique name; it can't be duplicated by other label lines in the batch file. You can, however, have more than one Goto command leading to the same label line.

The following batch file demonstrates how a Goto command can be used to repeat a process:

```
ECHO OFF
:ONEMORETIME
ECHO ABCDEFGHIJKLMNOPQRSTUVWXYZ
GOTO ONEMORETIME
```

The Goto command points execution to the ONEMORETIME label line, which in turn causes the Echo command that follows to execute again. The line containing the alphabet will display over and over until you press Ctrl-Break or Ctrl-C to interrupt the batch file.

Being able to jump to a line in a batch file would be useless, however, if you always wound up at that line. Either you'd have a process that couldn't end itself (as in the last example), or the batch file would contain a group of command lines that always got skipped.

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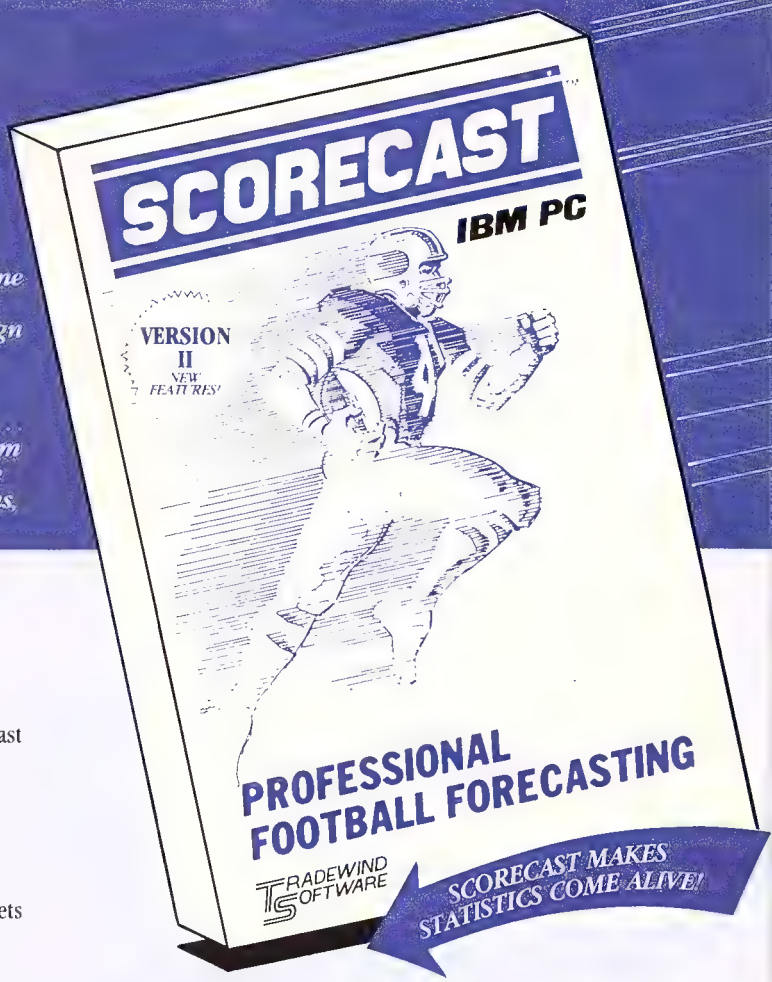

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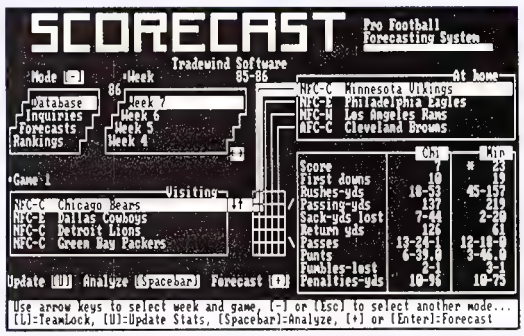

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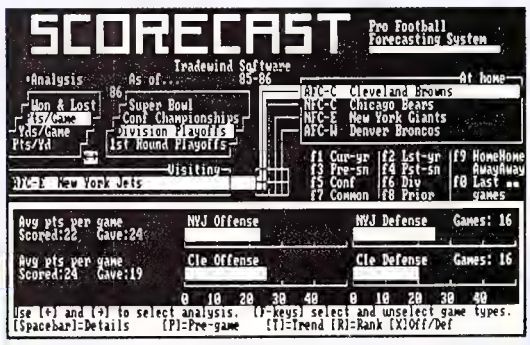

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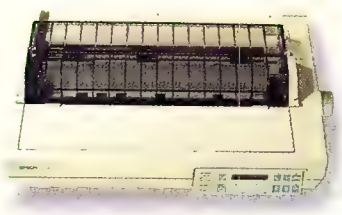

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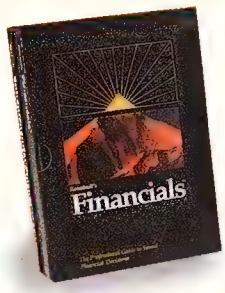

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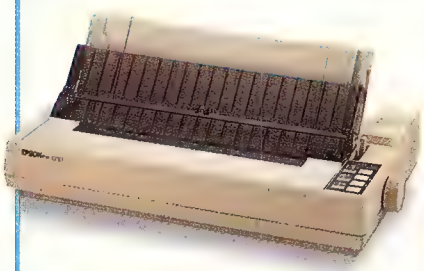

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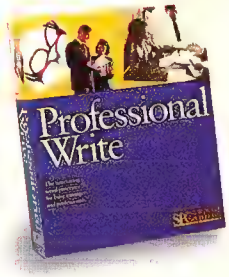

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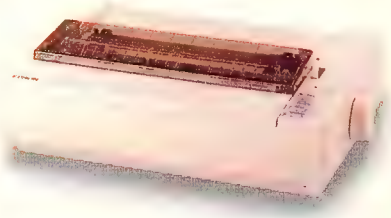

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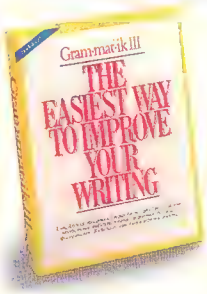

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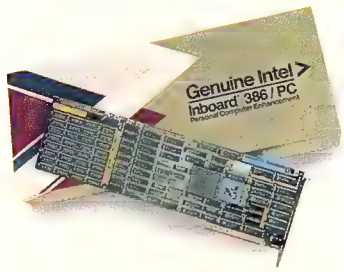

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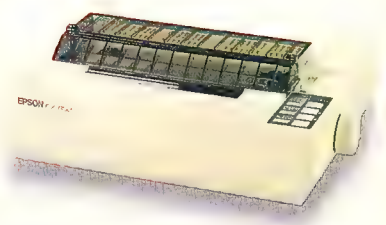

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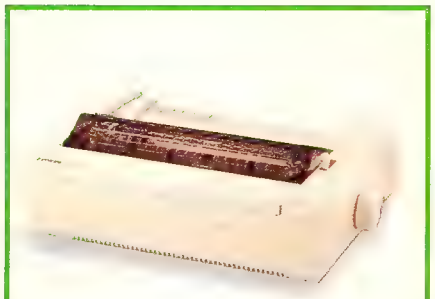

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Upgrade ideas and troubleshooting tips for the investment-wise computerist.

How to Install A Fax Board

FAX BOARDS ARE one of 1989's hottest hardware add-ins. Flexible and relatively inexpensive compared with standalone fax machines, fax boards are especially popular with small-business owners and managers and home-office users who want to take advantage of the boards' special features without incurring the expense of a high-end standalone fax. (For a closer look at fax technology, see "The Basic Fax" on page 53.)

If you have done your homework, you may have already decided to buy a board and install it yourself. Before you start, you should be aware of some general facts and a few pitfalls that you may encounter. Installing a fax board is not a project for the novice: You will need a basic grasp of the hexadecimal (hex) numbering system, in addition to some rudimentary knowledge of how hardware and software work, as you may run into conflicts between the new fax board and your existing hardware or between fax software and your other memory-resident programs. Various parameters in the fax software, such as page lengths and printer port settings, may need fine-tuning. To give you an idea of what you can expect—and what you should avoid—I will walk you through the process step by step.

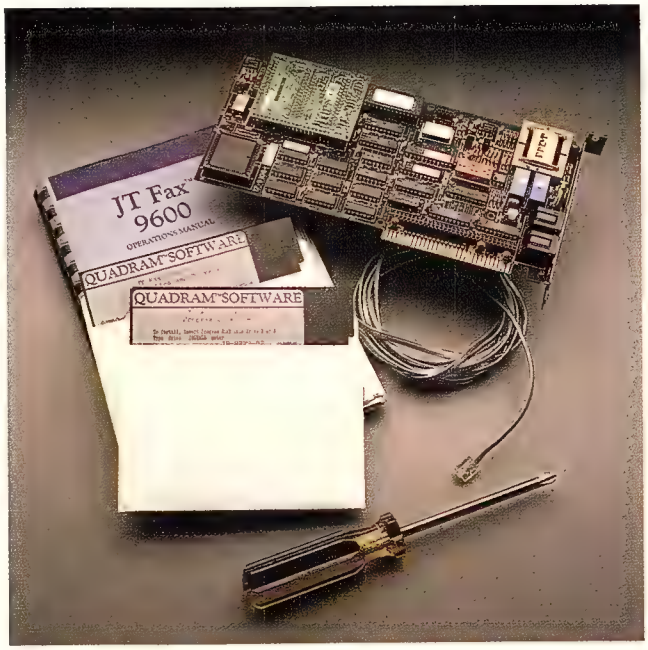
For this project, I installed the Quadram JT Fax 9600 board, one of the most popular fax boards currently available, into a Tandy 1000 TL with 640K of RAM, 2MB of expanded RAM, a hard drive, a CGA card, and a Computer Eyes Video Digitizer card. The installation steps are covered in greater detail in the JT Fax 9600 documentation, but the general procedures and potential problems apply to many other brands of boards as well.

Get Ready, Get Set

Before you begin installing your fax board—or any other type of board, for that matter—make sure that your body is free of all static electricity. *Do not* perform the installation while standing on a carpeted floor, especially in dry weather. Ground yourself by touching a grounded piece of metal, such as bare metal on the outside of your computer while it is plugged in. Try not to touch at any time during installation either the gold card-edge connector that attaches the fax board to the computer's expansion slot or any chips on the fax board you are installing.

The biggest problem you may run into is hardware memory conflicts. An IBM or compatible computer running DOS can directly address up to 1MB of memory: The area between zero and 640K is for DOS, your programs, and your data; the next 256K is for video memory; and the final 128K is for the system's ROM. The JT Fax 9600 has 2K of memory on it. The amount of memory will vary from one brand to another, but in any case, the memory of the fax board must be integrated into your system. Somewhere within that 1MB of system memory, you will need to find an area not in use and assign its address to the memory on the fax board.

You assign addresses by setting the dual in-line package (DIP) switches found on the component side of the fax board. These small slide or lever switches are easy to spot: One side of their colored plastic shells will usually be marked *off* or *on*; ►



WHAT YOU NEED: Fax board and fax software, RJ11 modular telephone cord (usually supplied with fax board), screwdriver.
DIFFICULTY LEVEL: Intermediate
ESTIMATED PROJECT TIME: 1 Hour, 30 minutes
ESTIMATED COST: $300–$700, depending upon brand and model of fax board used.

by DAVID S. VEALE

some may simply be marked *open*, which means the same as *off*. Your fax board's manual will tell you how to set a certain switch or switches to change the address assignments. Write down their starting positions so that you can return to the original settings if you run into trouble.

If you have 512K or less of RAM installed in your machine, you may tell the fax board to use an area between 512K and 640K that your RAM isn't using. If you have 640K or more, you will need to find space within the 384K normally assigned to video memory and ROM. Finding an unused area will probably require some trial and error. To make matters worse, other hardware installed in your system may also be grabbing free areas for its own purposes, greatly reducing the number of places available. If you try to give a memory area to your fax board that's already being used by the computer or one of your expansion boards, neither the board nor the equipment it conflicts with will work. For example, if you assign your fax board's memory to address C800 hex (51,200 decimal) and then turn on the computer and find that the hard disk doesn't work, you'll know that the hard drive is also using address C800 and that you'll need to assign the fax board's memory to another address.

To help you avoid these conflicts, Quadram designed the JT Fax so that its memory can be assigned to any of 19 different addresses, at least eight of which should not conflict with hardware found in a "standard" computer (a machine with only a CPU, memory, drives, and a monitor—no specialized boards or non-standard drives such as CD-ROMs). The following chart is similar to the one supplied by Quadram, but it applies to fax boards in general:

IF YOU HAVE THIS:	AVOID THESE ADDRESSES:
640K or more of RAM	8000 to 9FFF hex
an EGA card	A000 to C7FF hex
an XT with a hard drive	C800 to CBFF hex
expanded memory board	D000 to EFFF hex
an AT system	E000 to EFFF hex
any computer	F000 to FFFF hex*

*Used by ROM BIOS

Quadram recommends that you use an address between CC00 (the default) and CF80 hex. These addresses seem to be the safest. The default address CC00 should work for about 75 percent of users; the rest will have to resort to trial and error.

Selecting an appropriate address is the only hardware setup necessary with the JT Fax 9600. This board doesn't use a COM port or standard PC communications port to perform its functions. If it did, there would be several other hardware issues to consider, such as appropriate COM port numbers, baud rates, and communications settings. The JT Fax has the option of adding a modem "piggyback" board, which gives the fax board the ability to act as a regular 1,200-bps modem as well as a fax. If you're using a board with a modem option or installing a board that uses a COM port, see "How to Install an Internal Modem" (April 1989, page 109).

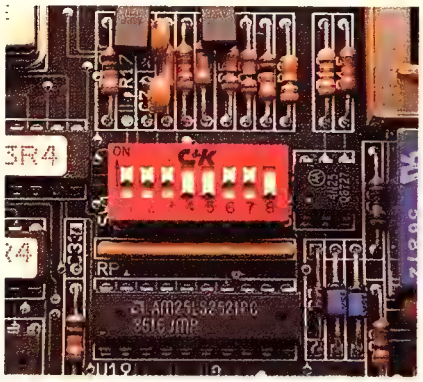
STEP 1. INSTALL THE FAX BOARD

Once you have the DIP switches set for the address you've chosen to use, you're ready to install the board. Make sure your computer and any attached peripherals are turned off; for extra safety, unplug the PC after first grounding yourself. Then remove the screws that secure the machine's cover, slide off the cover, and set it aside.

Now examine the inside of your system and locate an available expansion slot. The board can generally go into any slot, but on some XT systems, you can't put the board into the last slot (the one closest to the center of the computer) because that one's reserved for a floppy drive controller board. Check your documentation. When you've selected the slot you want, loosen the screw that secures the silver slot cover on the back of the computer, remove the cover, and set it aside.

Next, position the fax board so that the gold card-edge connector is directly above the expansion slot. Gently push the board straight down so that the card-edge connector snaps into the slot. When the board is inserted correctly, the cut in the top of the silver slot cover at the end of the board should line up with the screw hole above the slot opening at the back of the computer, enabling you to reinsert and tighten the retaining screw.

Now you can reinsert the retaining screw and plug your PC in, but don't put the cover back on yet. First turn on the computer and verify that all of its drives and other boards are working correctly. If one or more of your boards or other devices doesn't seem to be functioning, you probably have a memory conflict between the non-functioning device and the fax board.



Write down the starting positions of the DIP switches so that you can return to the original settings if you run into trouble.

If you have a conflict, turn off the computer and wait at least 10 seconds to give the power supply time to reset its internal circuits. Remove the retaining screw, take the fax board from the slot, reset the DIP switches to another memory address, and reinstall the board. Keep repeating this procedure until all of your components function properly with the fax board installed.

STEP 2. CONNECT THE TELEPHONE CABLE

If the board is installed properly, you should be able to see the two female RJ-11 phone jacks at rear of the board when you look at your computer from the back. One of these is for the phone cable that comes with the board; the other is for a regular telephone. You don't have to plug a phone into the board's jack—it's merely supplied so that you can use a telephone and the fax board from the same telephone wall jack.

Plug one end of the phone cable that comes with your fax board into either one of the phone jacks in the board. Plug the other end of the cable into a modular-phone wall jack. If you're also connecting a telephone, plug the cable that would normally go into the wall jack into the open jack at the back of the fax board. The telephone should function normally whether the computer is on or off. The only time you can't use the telephone is when the board is sending or receiving a fax. Be careful not to lift the phone receiver while the fax is in operation—the background sounds picked up by the ►

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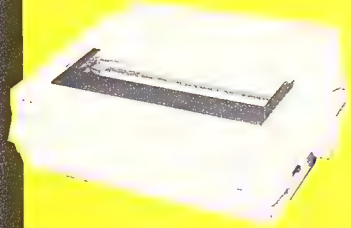

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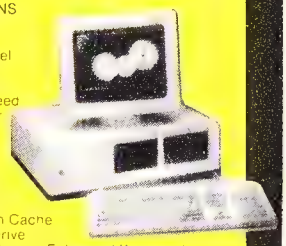

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telephone are capable of garbling the transmission.

Once the board is configured and installed and the cables are connected, you've finished the hardware aspects of the project. At this point, you could put the cover back on your machine, but it's probably a good idea to wait until you've installed the fax board software and successfully sent or received a fax, just to make sure no further hardware adjustments are necessary.

STEP 3. INSTALL THE FAX SOFTWARE

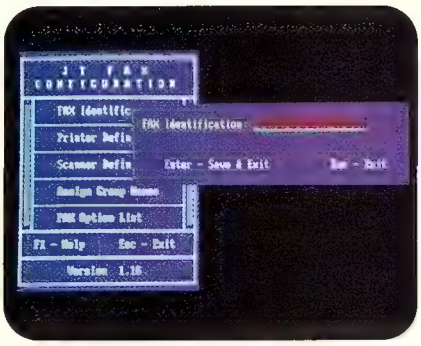
Fax boards come with software that controls the operations of the board, prepares documents to be sent as faxes, and converts incoming faxes to a format your computer can read. Like many fax boards, the JT Fax has software that is a terminate-and-stay-resident (TSR), or memory-resident, program. The JT Fax is designed so that its software runs in the background, which means that in many cases you can actually continue using another program while your system sends and receives faxes. Your system's ability to seemingly do two tasks at the same time is a very simple form of multitasking.

The JT Fax's manual covers all software setup steps in great detail. As the details wouldn't apply to all brands of fax boards, I'll just highlight the major points that would also apply to other types.

First, you need to back up your fax software's program disk (refer to your DOS manual if you need to refresh your memory of backup procedures). When the process is complete, put your original program disk away in a safe place and proceed with the software installation, using your new backup disk.

The JT Fax has an automated installation program to help you configure the software. To run it, you type D:INSTALL (where D is the letter of the drive containing the program) and press Enter. The installation program then loads and runs. Most fax programs ask a series of questions: Do you have a system with one floppy drive, two floppy drives, or a hard drive? Which drive does your system boot from? Which drive are you installing the fax software from? Which drive do you want to install the fax software onto? To each of these questions, select the appropriate drive letter from the menu presented.

Next, the program asks if you want the



The JT Fax 9600 board by Quadram has 19 different options in its configuration program's Fax Option List.

fax software loaded and the appropriate DOS environment variables set automatically whenever you start your system. If you answer *yes*, the installation program automatically adds a line to the AUTOEXEC.BAT file in the root directory of your boot disk. If AUTOEXEC.BAT doesn't currently exist, it's created. Automatic loading of the software means that it will be using memory even if you have no plans to send or receive a fax. If you're an occasional fax user and usually have some warning when you are going to receive a fax, you may prefer to load the fax program manually when you need it.

Once you've answered all of the setup questions, the installation program copies the fax software onto your hard disk or the floppy disk that you use to boot your system.

STEP 4. CONFIGURE THE FAX SOFTWARE

At this point, you'll need to tell the fax software several details about your system so that the board can use your equipment efficiently. Before you begin, look through your fax board manual to find out exactly what questions will be asked and write down the answers so that you won't have to abort the procedure to find an answer.

The JT Fax has a program to help you enter this information. If your board has a similar program, make the drive holding the newly installed fax software the current drive and type the command CONFIG at the DOS prompt. The program will present you with a menu of setting options. Use the arrow keys to highlight the settings you need and then press Enter.

The first option is Fax Identification—the name or number that will print on the cover sheet of all the faxes you send. Most people enter the phone number of their own fax machine here, but any identification you choose will suffice.

The second option is your Printer Definition. From the menu, select the brand and model of your printer and the computer port to which it's connected. (If your brand of printer isn't listed, try selecting an IBM Graphics Printer or an Epson RX or FX series printer. Most IBM-compatible printers are compatible with one of these.)

Next comes the Scanner Definition option. You enter information here only if you have a document scanner (a hardware device that can digitize a written document and store it as a file on your computer). If you have a scanner, select the brand and model from the list presented.

The next option is called Assign Group Names. The JT Fax has the ability to broadcast or automatically send the same fax to several different locations at the same time. You can create a group—for instance, "sales offices"—and place the appropriate phone numbers in it. Then you can make the board call each number and automatically send the fax to each office. The JT Fax software allows up to five different group names. If you're planning to use the broadcasting feature, select this option and enter the names of the groups, such as "sales," "engineers," and so on.

The last selection in this configuration program is the Fax Option List (see photo), which brings up several submenus that ask you to provide various details—for instance, how your faxes should look, what type of hardware is in your computer, what to do if you send a fax to a busy line, and what keys you want to designate as hot keys. The JT Fax configuration program has 19 different options, including the font you want your faxes sent in, the size of paper you'll use, whether you're using a color monitor, and how many times the fax board should let the phone ring when it's trying to transmit. Which options you choose depends on your own fax board and computer. Their documentation is your guide.

Let me caution you about setting a hot key. As I mentioned earlier, the fax software is a TSR, or terminate-and-stay-resident program. This means that you can activate it while using another application simply by pressing a certain key sequence. For the JT Fax, this key combination is al- ►

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ways a special key plus *F*. Be careful that your choice doesn't conflict with the other software you're using. For example, I first set the fax software to pop up when I pressed Alt-F. Unfortunately, that's the key combination for indenting a paragraph in Microsoft Word. If I'd had the fax software in memory while using Word, pressing Alt-F to indent a paragraph would have caused the fax software to pop up instead. If you're a touch-typist, don't use the right Shift as your hot key, or the fax program will pop up every time you type a capital F. Use the left Shift key instead: In a typing class, a left Shift-F combination would get your knuckles slapped.

If you have other memory-resident programs loaded, make sure your fax hot-key choice won't conflict with theirs. (For details on what makes this happen, see "Make Your Pop-up Programs Behave" on page 72.)

Once your parameters are set, you can press ESC to exit the configuration program and return to DOS. If you set up the software to load automatically, you can reboot your system now to load the fax software. If you're loading it manually, type in the command indicated in your documentation to get it started.

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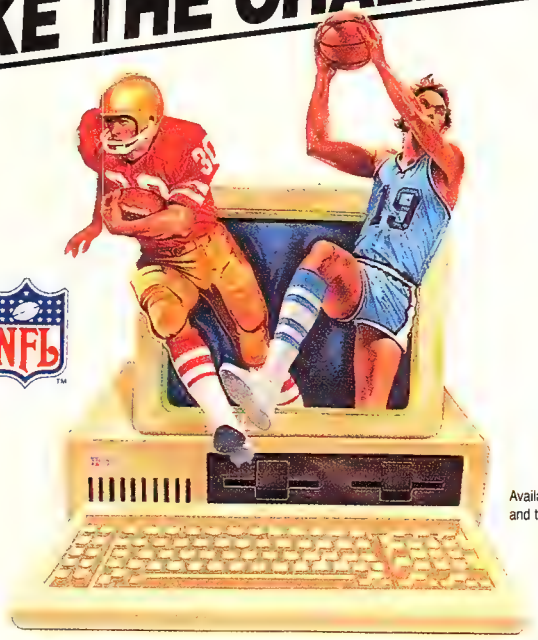

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Installing the JT Fax board isn't quite as complicated as it sounds, but it does require a good deal of patience. I had to install the board three times because of memory conflicts with other hardware. It also took considerable trial and error before I realized that I had to load the fax software before I loaded Sidekick Plus, another TSR—otherwise, Sidekick would lock up my computer when I tried to exit the program and return to the underlying application. I tried loading the JT Fax software along with PC Tools Deluxe 5.0 and experienced no problems. Quadram does warn, though, that since there are no hard rules about how TSRs operate, you should exercise extreme caution when loading more than one at a time.

Unless you're lucky and everything goes smoothly on the first try, expect to do a little experimenting. But with some technical know-how, a good manual, and a modicum of self-confidence, you should be up and faxing in an hour or two. ◆

DAVID S. VEALE *is the PC Coordinator at IDG Communications/Peterborough. Write to him c/o* PC Resource, *80 Elm St., Peterborough, NH 03458.*

WARNING

In my column "Installing A Second Hard Drive" (March 1989, page 89) Step 9 says to attach the connector on the very end of the 34-pin data cable to the new hard drive, and the connector *before* the end of the cable to the old drive. A reader reminded me that some systems have cables in which the wires between the connectors are twisted. Following Step 9 to install this kind of cable could make the machine think that drive C is drive D, and vice versa, which would cause it to reformat your *old* hard drive. **For safety's sake, be sure to back up the data on your existing hard drive before adding a second one.**

—D.V.

PC Magazine, Jan. 31, 1989, awarded Northgate's 286/12SM system its highly respected...

EDITOR'S CHOICE

PC MAGAZINE

PC Magazine said:

"**Speed by design:** it's clear that Northgate Computer Systems values quality for the dollar with an emphasis on speed. The hardware and software components used in the Northgate 286/12 are chosen to give the most pep for the fewest dollars.

While the 286/12 is not the least-expensive fully configured system in this series, it simply gives more of everything."

THEN PC MAGAZINE CONCLUDED:

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100% Customer Satisfaction!

That's the BEST reason Northgate's 286/12SM complete system deserves "Your Choice" as your next computer!

Unpack the carton, plug it together. Turn it on. The already formatted hard drive purrs. Up pops the C prompt. Type DIR. **Zip.** Files fly by so fast you have to freeze the screen to read them.

Then you notice...68 megs or more of RLL hard disk storage. No partitions either. Northgate gives you MS-DOS 4.01 with this system. Most others don't even include DOS. They charge extra. Including Dell.

Now...take it for a test drive. Load your programs. Finished so fast? Run 1-2-3. Try a re-calc. You hardly get your finger off the Enter key before it's done. *You don't know what fast is 'til you've run this baby.*

And the 286/12SM exudes quality. No cheap, old fashioned 12" monitor. Here's a high quality 14" graphics monitor, or even better, a true 16-bit (not 8-bit) VGA graphics monitor puts 256 colors on the screen. *Simply magnificent.*

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You can't buy OmniKey anywhere but Northgate! And it comes standard with all our systems.

Yes, you may pay a few dollars more for this system. But you know you're dealing in the Big Leagues with Northgate! *So if you're going to settle for less and buy at the lowest price, without concern for League Leading Performance, call the other guys!*

But if you want the 286/12 system that sets a new standard in the industry, backed by a company that just won't let you down, *CALL NORTHGATE.*

Complete System Price

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Fully configured with 68 MB hard drive, 14" monitor, 1.2 MB and 1.44 MB floppy drives, OmniKey/102 keyboard AND MORE...

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PC MAGAZINE EDITOR'S CHOICE

FACT FILE

Northgate 286/12
Northgate Computer Systems
13895 Industrial Park Blvd., #110
Plymouth, MN 55441
(800) 548-1993
(612) 553-0111

List Price: With 1MB RAM, 67MB hard disk, 1.2MB 5¼-inch or 1.44MB 3½-inch floppy disk drive, monochrome card and monitor, DOS 3.3, $1,995; with VGA card and monitor, $2,599.

In Short: Northgate bundles high-performance systems. The competitively priced 286/12 combines hardware and software components to get the most from the 12-MHz AT-Level architecture.

Other specifications and standard features that make this NORTHGATE "YOUR CHOICE":

- Processor—Intel 80286/12 (not a 10).
- Cabinet—Full size desktop case; control panel witn system reset button, speed switch (8/12MHz), hard drive in-use light, 200-watt power supply.
- Hard Drive—Microscience 68MB, 28MS access time.
- Controller—16-bit, RLL, 1:1 interleave for 800,000 BPS data transfer.
- Famed OmniKey/102 keyboard—pick of the pros.
- Floppies—One 1.2MB 5¼ inch; one 1.44MB 3½ inch.
- Monitor—14" flatscreen, amber or white, 1000 line resolution capability.
- Video Adapter—Hercules compatible with parallel port.
- Software—Northgate MS-DOS 4.01 with GWBasic, hardbound covers; PCKwick hard drive caching; Northgate System and DOS on-line user's guide; Northgate Utilities.

All systems are custom configured and manufactured at our production facility in Plymouth, Minnesota. Approximately 80 percent of parts used in Northgate systems are made in the U.S.A.

Hard drive is factory-formatted (we can do this legally because we are a DOS licensee) and system can be unpacked and ready for operations on site in about 10 minutes. Full instructions (written and printed in English) are provided.

SYSTEM OPTIONS:
Display—16-bit VGA Greyscale, Analog or Multisynch.
Hard Drives—Up to 600MB, SCSI, ESDI, RLL (Northgate believes MFM drives are obsolete)

Let's talk differences and what makes Northgate a better value. Many systems have 1MB of RAM (including Dell, CompuAdd). BUT...only 640K is usable. The other 384K is "shadowed."

That means the system ROM and video ROM occupy the other 384K you paid for. Without your being able to use it! No RAMDISK! No Disk Caching! No Spoolers. And you can't use SmartDrive for Windows—want to see what S-L-O-W is? Try it.

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Northgate's proprietary motherboard—*DESIGNED AND MADE IN THE U.S.A.*— gives you a full 1MB of usable RAM. So you can use 384K for your applications. And system performance is unaffected. *Now compare prices!*

The 286/12SM board has serial and parallel ports built in. The board has two 8-bit and four 16-bit slots. A special memory board slot we call "Lightning Alley" runs at processor speed—12MHz—not 6 or 8 MHz as do others. That's as much as 100% faster!

One megabyte of RAM can be installed on the motherboard. Memory cards enable a total of 16MB to be installed in the system. Two floppies, too, so you can use 1.2 and 1.44MB diskettes, as well as 360's and 720's.

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For corporate government and institutional sales in Texas, Louisiana and Oklahoma, call (512) 343-7591

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Tandy 1000 Model

NOW for AT

Leprecards feature components utilizing the latest technology. You can use them as the first or second hard disk in your system. Low power drives mean less strain on your system. You get a 1-year warranty, unlimited technical support, & our illustrated installation and user's guide. Models available for IBM PC/XT and compatibles, AT's and compatibles, as well as the TANDY 1000/A/SC/TX/TL/SL.

FREE SOFTWARE including **TakeTwo** and **Menus Direct,** the backup utility PC MAGAZINE named "Editor's Choice" in 1986 & 1987. Also included is PC-KWIK disk caching from Multisoft.

COMPUTER TYPE	21MB 40MS	32MB 40MS	49MB 40MS	65MB 16MS
8 BIT PC/XT	$299	$319	$479	$599
16 BIT PC/AT	N/A	$379	$549	$639

HIGH PERFORMANCE SCSI DRIVES	21MB 40MS	32MB 40MS	49MB 40MS	60MB 24MS
	$349	$379	**$399**	$689

Best Buy!

TakeTwo

MULTISOFT

MENUS DIRECT

Tandy 1000 models add $20.

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$219

- 4⅛" scan width, 400 dpi resolution
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- Comes with short slot controller & 71" cable
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The external high density 1.44MB floppy drive for PC/XT computers is the easy way to transfer PS/2 data between systems. It includes a replacement high speed controller, cables and manual.

FREE: TakeTwo, the backup utility PC MAGAZINE names as their Editor's Choice. Now you have a fast, affordable backup solution that brings you media compatibility with the latest IBM PS/2 systems.

720K Internal for PC/XT/AT. **$99**
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Instant Laptop & PS/2 compatibility. All kits include bracket to mount in 5¼" drive bay, black & grey face plates, and mounting rails. 144MB XT kits include replacement floppy controller that doubles the data transfer rate.

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- Formatted, Partitioned & Tested

Size	Model	Speed	Format	Capacity	Price
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HH	ST251-1	30ms	MFM	42MB	$449
HH	ST277R	40ms	RLL	65MB	$499
FH	ST4096	28ms	MFM	80MB	$599

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Shamrock 286-16	15.9	2.6	$ 899
Shamrock 386-16	18.7	2.8	$1,799
Shamrock 386-20	24.4	4.3	$1,999
Shamrock 386-25	30.5	5.8	$2,799

SCSI DRIVES	PRICE
Seagate ST225N 20 meg 65 ms	$299
Seagate ST157N 49 meg 40 ms	$379
Seagate ST277N 65 meg 40 ms	$469
Seagate ST296N 80 meg 28 ms	$549

VIDEO OPTIONS	PRICE
Monographics Card & Monitor	$139
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ST225N	5.25"	20MB	65 msec.	$329
ST138N	3.5"	30MB	40 msec.	$369
ST157N	3.5"	49MB	40 msec.	$389
ST277N	5.25"	64MB	40 msec.	$499
ST296N	**5.25"**	**80MB**	**28 msec.**	**$559**

For ST02 Combination SCSI Hard/Floppy Controller add $40.

Seagate

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Practical applications for aspiring Quick Basic, assembly, and C language programmers.

A Word Game for A Change of Pace

IT'S SUMMER AND time to have some fun. Instead of devoting this month's column to the customary utility programs that demonstrate methods of making up for deficiencies in DOS, we'll look at a simple but addictive word game. Besides, haven't you always promised yourself that one of these days you'd find time to expand your vocabulary?

The program is based on a game called Jotto, which was published in 1956 by The Jotto Corp. of New York City, but I believe the idea is much older. I've called my computer version Jots. It's much like a combination of Hangman, anagrams, and a word version of Mastermind (by Invicta Plastics Ltd.).

When a game of Jots begins, the computer selects a secret 5-letter word. You try to guess the word by choosing other 5-letter words. Each time you type in a guess, the computer tells you how many letters there are in common between the secret word and your guess. If you pick your words carefully, you should be able to discover all of the letters in the secret word after 10 to 12 tries and then arrange those letters to guess the secret word.

For example, suppose the computer picks the word *brawn*. Your series of guesses, if you are lucky, may go something like this:

Guess	Points
fight	0
frown	3
backs	2
crown	3
brown	4

A little thought should convince you that there is a *b* in the secret word but not a *c*, and that three of the letters in *rown* are also in it. You still have to find out whether the word contains an *a*, *k*, or *s*. Perhaps you will be lucky and look for the *a* next by guessing *brawn*.

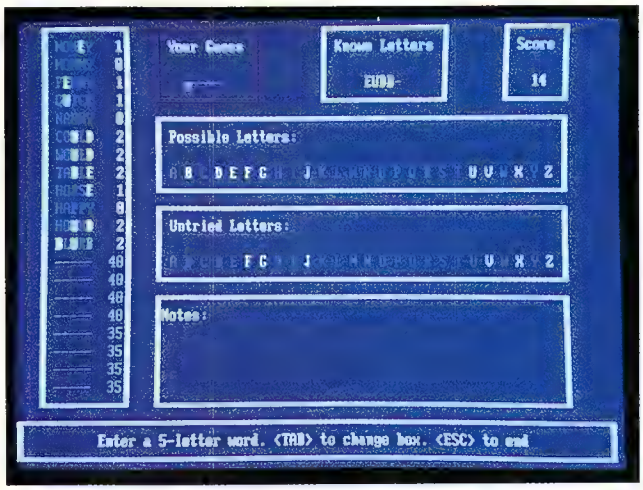
Most games take longer than this. You'll find as you play that you need three lists of letters: those you have not yet tried, those which cannot be in the secret word, and those which you're sure are in the word. Jots helps you with these housekeeping chores while you play. It tells you how many letters are common between your guesses and the secret word, keeps the list of letters you have not tried, and lets you maintain lists of impossible and known letters. It also lets you make notes on screen at any time, so you can keep track of the logic of searching for letters. By studying these lists, applying a little logic, and finding suitable words to test, you should soon be able to guess the secret word.

Introducing the Program

The best way to understand how the program works is to compile the Quick Basic listings shown here this month, create a list of 5-letter words, and simply spend some time playing the game. You may soon find that you are addicted to it.

For space reasons, I am unable to pre- ►

PROGRAMS: J.INC, MAIN.BAS, GUESS.BAS, GUESLIST.BAS, SCORE.BAS, USEDLIST.BAS, POSSLIST.BAS, KNWNLIST.BAS, MSGBOX.BAS, BOXES.BAS, WORDS.BAS, JOTS.MAK
LANGUAGE: Quick Basic
PROGRAMMING LEVEL: Intermediate
WHAT YOU NEED: Quick Basic 4.0
WHAT THEY DO: Provide you with a usable subset of a game, the remainder of which you can create yourself. (You can also download the entire program from The *PC Resource* BBS.)



by HARDIN BROTHERS

sent the entire Jots program here. The listings constitute a very usable subset of the entire game, but to make the game complete, you will have to create and maintain the list of possible secret words yourself. Also, both the notepad and checks for legal guess words have been omitted. The version of the program on The *PC Resource* BBS is complete and includes a list of almost 3,000 words from which the computer and you can choose. It also has on-line instructions and a simple menu system.

I've chosen to write Jots using an extremely modular programming style. I've ►

THE INNER LOOP

News, product previews, and technical tidbits for the curious programmer.

KEEPING EVEN A small programming project organized can be almost impossible. How do you remember what procedures are defined in what files or where you have initialized key variables? As soon as you start using multiple source-code files, which generally make programming easier, you can be faced with an organizational headache.

I've looked at three products that can help keep your programming projects organized. CC-Rider works only with C language programs and contains two utilities. One reads through a group of source-code modules, along with their related .H (include) files, and builds a database of symbols used in your program and the file in which each is defined. CC-Rider understands your program code enough to expand macro commands and to issue syntax error messages (unfortunately, it sometimes flags perfectly normal code as containing errors).

You install the second part of CC-Rider as a memory-resident utility before you start to program. Whenever you are curious about a symbol in your program, you simply press Alt-Left Shift when the cursor is near the symbol, and CC-Rider pops up in a window and displays that symbol's original definition. In a sense, CC-Rider turns your standard source-code files into hypertext files linked through the symbols you use.

A similar approach is taken by 4C, a product for both C and Pascal programmers. Like CC-Rider, 4C reads through your files, building a database of symbols, and lets you view the definition code for a symbol by pressing a single key. Unlike CC-Rider, 4C insists that you use its editor, not your own. The 4C editor may be serviceable, but it is substantially weaker than the other program editors I've tried. You can chain from the 4C editor to your own editor, but as soon as you do, you lose 4C's lookup facility, which is the only conceivable reason for using 4C to begin with.

CC-Rider is, unfortunately, much slower than 4C. I tested them both on a set of related C programs built from 88 source-code files and 35 include files. 4C built a 170K symbol file in about 80 seconds. CC-Rider needed four times as long to create a symbol table that was 2½ times as big. 4C could move from symbol to definition text almost immediately; CC-Rider often took more than 10 seconds to find information in its database and display the correct text on the screen. CC-Rider uses 188K of RAM; 4C takes more than 250K. Both take so much memory that compiling from inside an editor becomes either difficult or impossible.

Golden Bow Systems' Vq can be used to solve the same organizational problem in an entirely different way. Vq is a reasonably powerful text editor with multiple editing windows, compiling from inside the editor, macro commands, a sophisticated UNDO command, and most of the other features that are requisite in a good programmer's editor. On top of that, Vq has a sophisticated Search utility that can find words, either singly or in complex relationships, in groups of files.

Once Vq finds a group of files containing the words or labels you are looking for, it can display the relevant part of each file. Then, with a single key, it can open any of the files for editing. While it isn't specifically aimed at cataloging program symbols as are CC-Rider and 4C, Vq is in some ways a better solution to organizing a programming project. Vq usually found all references to a label in my test files a little faster than CC-Rider, but not nearly as fast as 4C. On the other hand, Vq is vastly superior to 4C as a programming (or even general-purpose) editor. Vq can also be used for other search-and-retrieval projects, since it can correctly display and update files prepared with several popular word processors.

These three products, along with the newest Quick and Turbo interactive programming environments, represent the beginnings of new, highly intelligent programming and text editors. Within the next year or two, I'm sure we'll see these three products as pioneers along trails that lead to much more sophisticated editors.

—H.B.

PROGRAMMING AND TEXT EDITORS

CC-RIDER 1.1c	4C 2.00	Vq 1.3
Western Wares	Tri-Technology Systems Inc.	Golden Bow Systems
P.O. Box C	1225 S. Elgin	2870 Fifth Ave.
Norwood, CO 81423	Forest Park, IL 60130	San Diego, CA 92103
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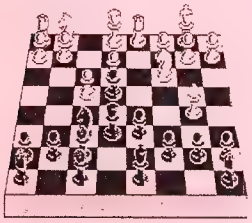
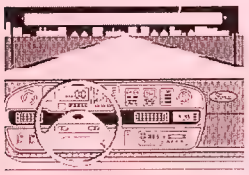
GAMES

ARCADE GAMES (106) Has Kong, 3-D Pacman, Bricks, Pango. (Requires color.)
BASIC GAMES (107) Pac-man, Lunar Lander, Startrek, Meteor, Breakout, and others.
CARD GAMES (109) Canasta, hearts, draw poker & bridge.
STRIKER (110) Defender-like game. "Top Gun" in space.
FLIGHTMARE (112) Futuristic fighter pilot game. (Requires color graphics adapter.)
SLEUTH (117) Who done it?
DND (119) Like Dungeons and Dragons.
ROUND 42 (120) Better than Space Invaders. 42 levels.
GAMES IN BASIC (124) Lander, biorhythms, desert, Phoenix, Star Wars, others.
QUEST (152) Role playing adventure fantasy game. (Requires CGA.)
SPACE WAR (158) Dogfight in outer space, using phasers, photon torpedoes, etc.
BRIDGE PAL (171) Complete game of contract bridge, with tutorial.
FENIX (193) Just like the famous arcade game.
PINBALL GAMES (197) Pinball, Rain, Twilight Zone, Wizard, etc.
KID-GAMES (GAM8) Animals math, clock game, alphabet, etc.
CHESS (GAM9) Incredible. 2D and 3D. Many levels. Play back moves, store games.



EGA RISK (GAM11) World domination in great color. Includes EGA Asteroids.
PC PRO-GOLF (GAM27-28) Great graphics. Complete 18 hole, 72 par course. (CGA)
PEARL HARBOR (GAM32) Shoot down Jap Zeros before they destroy U.S. Fleet. (CGA)
ULTIMA 21 DELUXE (GAM34) Best Blackjack game around. Includes Video Poker.
FORD SIMULATOR (GAM37) Great driving simulation. (Requires CGA).



MUSIC

PIANOMAN 4.0 (301) Turn your keyboard into a piano.
PC-MUSICIAN (302) Compose, save, and play music.

WORD PROCESSING

PC-Write 3.0 (434, 435, 436) (3 disks) Newest version! Very popular and complete. Includes spelling checker.
PC-TYPE+ (421-423) (3 disks) Excellent. Includes mail merge, 100,000 word spelling checker. Interfaces with PC-File+, PC-Style.
MAXI-MAX (432) 59 macros to use with Word Perfect 4.2 or later. 11 templates for forms, border designs, etc.

GRAPHICS

KEYDRAW CAD SYSTEM (1001, 1002, 1065, 1066) (4 disks) Popular. Also uses mouse. (Requires color graphics).

SIDEWAYS (1007) Prints text sideways. Useful for Lotus.
SIMCGA/HGCIBM (1027, 1062) (2 disks) Use with Hercules graphics card/compatible to run programs requiring CGA on your monochrome PC.
IMAGE 3-D (1048) Create and edit 3-D objects. Move, scale, rotate and tip image.
FINGERPAINT (1050) Use keyboard or mouse to draw. Like MacPaint. (Requires CGA or EGA).
DANCAD 3-D (1051, 1052) (2 disks) Create 3-D graphics. Rotate, magnify, etc. Runs on CGA, EGA, or Hercules.
FANTASY (1057) Create flowing graphic images with mouse or keyboard. (CGA).
FLOWCHARTING (1078-1079) Complete system for flow charts, organizational, electrical, etc., with symbols.

SPREADSHEETS

AS-EASY-AS (505) Great. Includes screen help menus. Utilizes function keys. A Lotus clone that reads Lotus files.
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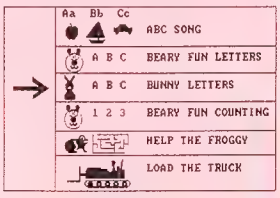

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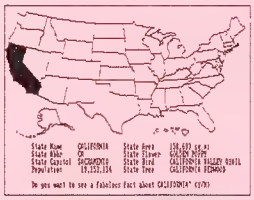

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done that for two reasons. First, several readers have asked for help writing Quick Basic programs that use multiple modules and files. The listings show how this can be done. Second, as the program grows—I'll add additional features to Jots eventually—I want to be sure that changes will not create unwanted side effects and bugs in the current code. If the program is correctly written, I could add a method of keeping track of high scores, for example, without making any substantial changes to the current program.

Modular Quick Basic

If you learned Basic with GW-Basic or one of the early Microsoft interpreters for CP/M, the TRS-80 computers, or the Apple II, you probably learned to carefully control the variable names that you used. If you accidentally used the same variable name twice, you probably introduced bugs into your program and corrupted some data. One of the major shortcomings of interpreted Basic is that all variables have global scope, which means they can be accessed and changed from any part of a program.

Quick Basic overcomes this problem by allowing variables with three different kinds of scope. A variable can have global scope and be accessible to an entire program, modular scope and be visible only within a single source-code file, or local scope and be used only within one or more subprograms (SUBs) or functions (FUNCTIONs).

The scope of a variable is controlled by its declaration. If you declare a variable as Common, it has global scope. If you declare it as Shared at the beginning of a module, it can be used anywhere within that module. If you declare it without using Shared at the beginning of a module, it is available to any subprogram or function that specifically declares it as Shared. And if you simply use a variable in a subprogram or function, it has local scope. If you use the same name elsewhere in your program, you will be referring to a different variable.

This month's program does not use global variables at all—only variables with modular or local scope. Seven of the modules in this month's listing are responsible for managing a box or window on the screen. Each uses the same variable names—TopRow, BotRow, and so forth—to keep track of the position of its own window. There is no conflict between these variables since none of them are global.

Examining the Listings

The Jots program is spread over 12 listings because each module has a specific, small task to perform. Despite the number of listings, however, it is not very long.

Listing 1 is an .INC file that is included in every module of the program. Its job is to define subprogram and function names that are accessible to all other procedures and to define a short set of constants.

Listing 2, MAIN.BAS, contains the beginning of the actual program as well as some short utility routines. Two of its procedures, PlayAGame and MakeGuesses, are responsible for initializing and coordinating the entire game.

Listings 3 through 9 take care of the seven boxes on the screen. The modules that allow user input are longer than those that simply print information in their boxes, but not much more complex. Each of the modules has a set of data that it manages and can, when necessary, request data from other modules and boxes.

Listings 4, 5, 7, and 8 each contain a very short function whose only job is to share the value of a variable with other modules. Jots would be slightly shorter and run slightly faster if those variables were simply given global scope, but then subprograms in other modules would be able to change the values of the variables, and subtle bugs might appear in the program.

Since other modules can use these function names almost as if they were variables, the other modules don't need to know that they are calling functions instead of using global variables. But if any other module should try to assign a new value to one of these function names, Quick Basic would immediately report an error.

Listing 10, BOXES.BAS, does the actual work of handling the boxes or windows on the screen. It is the only module that has direct access to the screen locations of each box. If you want to move the boxes on the screen, you only have to change the data definitions at the beginning of Listing 10. No other module knows or cares where its display boxes are located.

Finally, Listing 11, WORDS.BAS, handles the list of possible secret words. The version of Jots shown here assumes that the list is in a standard text file with one word on each line. The version available on The *PC Resource* BBS assumes that the list, WORDS.JOT, is in a special format that uses three characters instead of seven to store each word. It is easier to manipulate a list that is in standard ASCII format, but long lists take too much disk space and load too slowly.

Creating the Program

You can type in each listing, either with the Quick Basic editor or with another text editor, and save each. Once you have done that, you can compile the program in one of two ways.

If you want to use the Quick Basic environment, open the file MAIN.BAS first (Listing 2). Then use the LOAD FILE command to load Listings 2–10 as modules. You can then either debug the program in the Quick Basic environment or have Quick Basic create an .EXE file for you.

If you have a copy of Microsoft's Make utility (supplied with MASM, C, and Quick C), you can save Listing 12 as JOTS.MAK and then create the entire program automatically by typing *Make JOTS.MAK*. The BC compiler included with Quick Basic is called to turn each module into an object (.OBJ) file, and then Link creates the final program. If you have a different Make utility, you should have no problem converting Listing 12 to the correct format.

Before you run the program, you will also have to create a word list. Use the Quick Basic editor or any other text editor to create a list of 5-letter words, with one word on each line. I like to avoid proper nouns and plurals when I play Jots, but you can include them if you wish. While you are learning the game, the list can be quite short. Later, you will probably want to add more words. You should be able to find long lists of 5-letter words in any crossword puzzle dictionary.

Enhancing the Program

There are several minor alterations that you can make to the program. If you don't like the screen colors I have chosen, or if you have a monochrome monitor, you can change the color definitions in Listing 1. You can also change the location of boxes on the screen by altering the data statements in Listing 10.

When your word list is long enough, you may want to keep the player from using words like *QQQQQ* as a guess. You can add a function to Listing 11 that determines whether a word is in the list or ►

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not and call it from Listing 3 whenever the user finishes typing in a guess. Another function you might consider would add new words to the dictionary automatically if the user wishes. The version of Jots on The *PC Resource* BBS includes both of these features.

You could also make the game competitive by allowing the user to pick a number for the current secret word. Then two players could each select the same number and compare their scores at the end of the game.

You can even have different word lists, perhaps one for yourself and a simpler one for your children. Before you begin to play, you could copy the file you want to use to WORDS.JOT and begin. You might want to use a batch file to automate the process.

In any case, have fun with Jots. I find it to be a good way to relax in front of the computer when writing, programming, or using a spreadsheet gets too tiring. It may help you survive some of the hot summer days ahead. But be warned, it really *can* be quite addictive. ◆

HARDIN BROTHERS *is* PC Resource*'s West Coast editor. Write to him at 280 N. Campus Ave., Upland, CA 91786. Enclose a self-addressed, stamped envelope for a reply. You can also reach Hardin through Compuserve's Easyplex at 70007,1150.*

PROGRAM LISTING 1. J.INC is a file that is included in every module. It defines SUB programs and FUNCTION names accessible to all other procedures and also defines a short set of constants.

```
' J.Inc: Include file for all modules

DEFINT A-Z

TYPE BoxType
   TopRow AS INTEGER
   BotRow AS INTEGER
   LftCol AS INTEGER
   RtCol  AS INTEGER
END TYPE

' In Words.Bas:
        DECLARE SUB          InitWordList ()
        DECLARE SUB          PickAWord ()
        DECLARE FUNCTION  SecretWord$ ()
' In Guess.Bas:
        DECLARE SUB          InitGuess ()
        DECLARE FUNCTION  GuessAWord$ ()
' In GuesList.Bas:
        DECLARE SUB          InitGuessList ()
        DECLARE SUB          AddGuess (Word$)
        DECLARE SUB          RedrawGuessList ()
        DECLARE FUNCTION  GuessCount% ()
' In Score.Bas:
        DECLARE SUB          InitScore ()
        DECLARE SUB          AddToScore (Points%)
        DECLARE FUNCTION  GuessScore (GuessNumber%)
' In UsedList.Bas:
        DECLARE SUB          InitUsedList ()
        DECLARE SUB          AddToUsedList (Word$)
' In PossList.Bas:
        DECLARE SUB          InitPossList ()
        DECLARE SUB          RemoveFromPossList (Word$)
        DECLARE SUB          ChangePossList ()
        DECLARE FUNCTION  PossibleLetterList$ ()
        DECLARE SUB          RedrawPossList ()
' In KnwnList.Bas:
        DECLARE SUB          InitKnownList ()
        DECLARE SUB          ChangeKnownList ()
        DECLARE FUNCTION  KnownList$ ()
'  In MsgBox.Bas:
        DECLARE SUB          InitMessage ()
        DECLARE SUB          PushMsg ()
        DECLARE SUB          PopMsg ()
        DECLARE SUB          ShowMessage (Msg$)
' In Boxes.Bas:
        DECLARE SUB          InitBoxes ()
        DECLARE SUB          MakeBox (BoxNum%, BoxColor%)
        DECLARE SUB          NormalBox (BoxNum%)
        DECLARE SUB          HighlightBox (BoxNum%)
        DECLARE SUB          BoxCoords (BoxNum%, Box AS BoxType)
' In Main.Bas:
        DECLARE SUB          Pause ()
        DECLARE FUNCTION  YesNo$ ()

CONST GuessListBox = 1      'Box IDs
CONST GuessBox = 2
CONST KnownBox = 3
CONST ScoreBox = 4
CONST PossListBox = 5
CONST UsedBox = 6
CONST MessageBox = 7
CONST AnotherGameBox = 8
CONST MaxBox = AnotherGameBox
CONST Normal = 15           'Color IDs
CONST Dark = 7
CONST Exclude = 9
CONST Known = 14
CONST HighLight = 4
CONST Uncertain = 7
CONST Background = 1
CONST FALSE = Ø
CONST TRUE = NOT FALSE
```

End

PROGRAM LISTING 2. MAIN.BAS is the starting module and contains some short utility routines. It is responsible for initializing and coordinating the entire game.

```
' $INCLUDE: 'J.INC'

DECLARE SUB PlayAGame ()
DECLARE SUB MakeGuesses ()
DECLARE FUNCTION AnotherGame ()

' ***************************
' *** Program Starts Here ***
' ***************************

COLOR Normal, Background, Background
CLS
InitWordList
InitBoxes
DO
   PlayAGame
LOOP UNTIL PlayAgain = FALSE
COLOR Dark, Ø
CLS
END

SUB PlayAGame
   DO
      COLOR Normal, Background, Background
      CLS
      InitScore
      InitGuessList
      InitGuess
      InitKnownList
      InitPossList
      InitUsedList
      InitMessage
      PickAWord
      MakeGuesses
   LOOP WHILE AnotherGame = TRUE
END SUB

FUNCTION AnotherGame
   DIM MyBox AS BoxType
   COLOR Normal, Background, BackgrounM
   CLS
   CALL BoxCoords(AnotherGameBox, MyBox)
   NormalBox (AnotherGameBox)
   LOCATE MyBox.TopRow + 1, MyBox.LftCol + 2, 1
   PRINT "Do you want to play another game? ";
   AnotherGame = (YesNo$ = "Y")
END FUNCTION

SUB MakeGuesses
   DO
      Word$ = GuessAWord$
      IF LEN(Word$) = 5 THEN
         AddGuess (Word$)
         IF Word$ = SecretWord$ THEN
            HighlightBox (MessageBox)
            HighlightBox (ScoreBox)
            ShowMessage ("You guessed the word!")
            Pause
            EXIT SUB
         END IF
      END IF
   LOOP WHILE LEN(Word$) = 5 AND GuessCount < 2Ø
   HighlightBox (MessageBox)
   ShowMessage ("Sorry you didn't guess " + SecretWord$)
   Pause
END SUB

SUB Pause
   WHILE INKEY$ <> "": WEND
   WHILE INKEY$ = "": WEND
END SUB

FUNCTION YesNo$
   DO
      Char$ = UCASE$(INPUT$(1))
   LOOP UNTIL INSTR("YN", Char$)
   YesNo$ = Char$
END FUNCTION
```

End

PROGRAM LISTING 3. GUESS.BAS handles the user's guesses and the guess box.

```
' $INCLUDE: 'J.INC'

DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol

SUB InitGuess
   CALL BoxCoords(GuessBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol
   NormalBox (GuessBox)
   COLOR Normal, Background, Background
   LOCATE TopRow + 1, LftCol + 2, Ø
   PRINT "Your Guess";
   COLOR Dark, Background, Background
   LOCATE TopRow + 3, LftCol + 4, Ø
   PRINT "-----";
END SUB

FUNCTION GuessAWord$
   ShowMessage ("Enter a 5-letter word. <TAB> to change box. <ESC> to end")
   HighlightBox (GuessBox)
   Guess$ = ""
   Row = TopRow + 3
   Col = LftCol + 4
   LOCATE Row, Col, Ø
   COLOR Dark, Background, Background
   PRINT "-----";
   DO
```

Listing 3 continued ►

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Listing 3 continued

```
   COLOR Dark, Background, Background
   LOCATE Row, Col + LEN(Guess$), 1, Ø, 7
   DO
      Char$ = UCASE$(INKEY$)
   LOOP UNTIL LEN(Char$)
   IF Char$ = CHR$(9) THEN                    'TAB
      PushMsg
      NormalBox (GuessBox)
      ChangeKnownList
      HighlightBox (GuessBox)
      PopMsg
   ELSEIF Char$ = CHR$(27) THEN               'ESC
      NormalBox (GuessBox)
      HighlightBox (MessageBox)
      PushMsg
      ShowMessage ("Do you really want to stop?")
      DO
         Ch$ = UCASE$(INPUT$(1))
      LOOP UNTIL INSTR("YN", Ch$)
      IF Ch$ = "N" THEN
         NormalBox (MessageBox)
         HighlightBox (GuessBox)
         PopMsg
      ELSE
         GuessAWord$ = ""
         EXIT FUNCTION
      END IF
   ELSEIF Char$ = CHR$(8) AND LEN(Guess$) > Ø THEN   'Backspace
      Guess$ = MID$(Guess$, 1, LEN(Guess$) - 1)
      LOCATE Row, Col + LEN(Guess$), 1, Ø, 7
      PRINT "-";
   ELSEIF Char$ = CHR$(13) AND LEN(Guess$) = 5 THEN  'Enter
      LOCATE Row, Col, Ø
      GuessAWord$ = Guess$
      EXIT FUNCTION
   ELSEIF Char$ >= "A" AND Char$ <= "Z" AND LEN(Guess$) < 5 THEN
         Guess$ = Guess$ + Char$
         COLOR Normal, Background, Background
         PRINT Char$;
      END IF
   LOOP
END FUNCTION
```

End

PROGRAM LISTING 4. GUESLIST.BAS handles the list of guesses.

```
' $INCLUDE: 'J.INC'

TYPE GuessType
   Word AS STRING * 5
   Points AS INTEGER
END TYPE

DIM SHARED Guess(1 TO 2Ø) AS GuessType, Guesses
DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol

SUB InitGuessList
   FOR Lp = 1 TO 2Ø
      Guess(Lp).Word$ = " "
      Guess(Lp).Points = GuessScore(Lp)
   NEXT Lp
   Guesses = Ø
   GameWonFlag = FALSE
   CALL BoxCoords(GuessListBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol

   NormalBox (GuessListBox)
   COLOR Dark, Background, Background
   FOR Lp = 1 TO 2Ø
      LOCATE Lp + TopRow, LftCol + 2, Ø
      PRINT USING "----- ###"; Guess(Lp).Points;
   NEXT Lp
   COLOR Normal, Background, Background
END SUB

SUB AddGuess (NewWord$)
   Guesses = Guesses + 1
   Guess(Guesses).Word$ = NewWord$
   Temp$ = SecretWord$
   Points = Ø
   IF NewWord$ <> Temp$ THEN
      FOR Lp = 1 TO 5
         Letter$ = MID$(NewWord$, Lp, 1)
         Posn = INSTR(Temp$, Letter$)
         IF Posn THEN
            Points = Points + 1
            MID$(Temp$, Posn, 1) = " "
         END IF
      NEXT Lp
      Guess(Guesses).Points = Points
      IF Points = Ø THEN
         RemoveFromPossList (NewWord$)
      END IF
      AddToScore (Points)
      AddToUsedList (NewWord$)
   ELSE
      AddToScore (GuessScore(Guesses))
   END IF
   RedrawGuessList
END SUB

SUB RedrawGuessList
   TempPossList$ = PossibleLetterList$
   FOR Lp = 1 TO Guesses
      TempKnown$ = KnownList$
      FOR Lp2 = 1 TO 5
         Letter$ = MID$(Guess(Lp).Word$, Lp2, 1)
         COLOR Normal, Background, Background
      IF INSTR(TempPossList$, Letter$) THEN
         COLOR Exclude, Background, Background
      END IF
      IF INSTR(TempKnown$, Letter$) THEN
         COLOR Known, Background, Background
         MID$(TempKnown$, INSTR(TempKnown$, Letter$), 1) = " "
      ELSEIF INSTR(KnownList$, Letter$) THEN
```

Listing 4 continued ►

Listing 4 continued

```
            COLOR Uncertain, Background, Background
         END IF
         LOCATE TopRow + Lp, LftCol + Lp2 + 1, Ø
         PRINT Letter$;
      NEXT Lp2
      COLOR Normal, Background, Background
      PRINT USING " ###"; Guess(Lp).Points;
   NEXT Lp
END SUB

FUNCTION GuessCount%
   GuessCount = Guesses
END FUNCTION
```

End

PROGRAM LISTING 5. SCORE.BAS handles the score box and tabulates the score.

```
' $INCLUDE: 'J.INC'

DIM SHARED Score, ScoreSet(1 TO 2Ø)
DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol
ScoreDefs:
   DATA 1ØØ, 95, 9Ø, 85, 8Ø, 75, 7Ø
   DATA 65, 6Ø, 55, 5Ø, 45
   DATA 4Ø, 4Ø, 4Ø, 4Ø, 35, 35, 35, 35

SUB InitScore
   CALL BoxCoords(ScoreBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol

   RESTORE ScoreDefs
   FOR Lp = 1 TO 2Ø
      READ ScoreSet(Lp)
   NEXT Lp
   Score = Ø

   NormalBox (ScoreBox)
   COLOR Normal, Background, Background
   LOCATE TopRow + 1, LftCol + 2, Ø
   PRINT "Score";
   LOCATE TopRow + 3, LftCol + 3, Ø
   PRINT USING "###"; Score;
END SUB

SUB AddToScore (Points)
   Score = Score + Points
   LOCATE TopRow + 3, LftCol + 3, Ø
   COLOR Normal, Background, Background
   PRINT USING "###"; Score;
END SUB

FUNCTION GuessScore (GuessNumber%)
   GuessScore = ScoreSet(GuessNumber%)
END FUNCTION
```

End

PROGRAM LISTING 6. USEDLIST.BAS handles the list of letters that have already been used in a word.

```
' $INCLUDE: 'J.INC'

DECLARE SUB RedrawUsedList ()

DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol
DIM SHARED UsedList AS STRING * 26

SUB InitUsedList
   CALL BoxCoords(UsedBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol

   NormalBox (UsedBox)
   LOCATE TopRow + 1, LftCol + 2, Ø
   PRINT "Untried Letters:"
   UsedList$ = " "
   RedrawUsedList
END SUB

SUB AddToUsedList (Word$)
   FOR Lp = 1 TO 5
      Letter$ = MID$(Word$, Lp, 1)
      MID$(UsedList$, ASC(Letter$) - ASC("@"), 1) = Letter$
   NEXT Lp
   RedrawUsedList
END SUB

SUB RedrawUsedList
   LOCATE TopRow + 3, LftCol + 2, Ø
   FOR Lp = ASC("A") TO ASC("Z")
      IF INSTR(UsedList$, CHR$(Lp)) THEN
         COLOR Exclude, Background, Background
      ELSE
         COLOR Normal, Background, Background
      END IF
      PRINT CHR$(Lp); " ";
   NEXT Lp
END SUB
```

End ►

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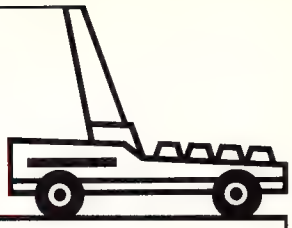

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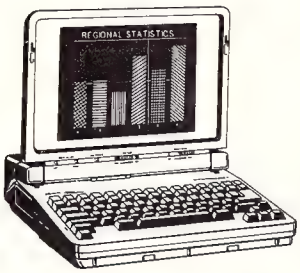

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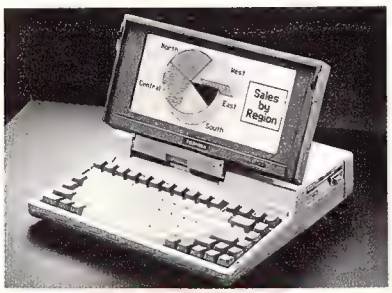

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PROGRAM LISTING 7. POSSLIST.BAS maintains the list of possible letters and lets the user change the status of letters in that list.

```
' $INCLUDE: 'J.INC'

DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol
DIM SHARED PossList AS STRING * 26

SUB InitPossList
   CALL BoxCoords(PossListBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol
   PossList$ = " "

   NormalBox (PossListBox)
   LOCATE TopRow + 1, LftCol + 2, Ø
   COLOR Normal, Background, Background
   PRINT "Possible Letters:";
   RedrawPossList
END SUB

SUB RemoveFromPossList (NewWord$)
   FOR Lp = 1 TO 5
      Letter$ = MID$(NewWord$, Lp, 1)
      Posn = ASC(Letter$) - ASC("A") + 1
      MID$(PossList$, Posn, 1) = Letter$
   NEXT Lp
   RedrawPossList
END SUB

SUB ChangePossList
   ShowMessage ("Enter letter to change, <TAB> or <Return> to guess")
   HighlightBox (PossListBox)
   DO
      COLOR Normal, Background, Background
      LOCATE TopRow + 1, LftCol + 35, 1, Ø, 7
      PRINT "=> ";
      DO
         Char$ = INKEY$
      LOOP UNTIL LEN(Char$)
      IF Char$ = CHR$(9) OR Char$ = CHR$(13) THEN      'TAB & RETURN
         LOCATE TopRow + 1, LftCol + 35, Ø
         PRINT "    ";
         NormalBox (PossListBox)
         EXIT SUB
      ELSE
         Char$ = UCASE$(Char$)
         IF Char$ >= "A" AND Char$ <= "Z" THEN
            Posn = ASC(Char$) - ASC("A") + 1
            OldValue$ = MID$(PossList$, Posn, 1)
            IF OldValue$ = " " THEN
               MID$(PossList$, Posn, 1) = Char$
            ELSE
               MID$(PossList$, Posn, 1) = " "
            END IF
            RedrawPossList
            RedrawGuessList
         END IF
      END IF
   LOOP
END SUB

FUNCTION PossibleLetterList$
   PossibleLetterList$ = PossList$
END FUNCTION

SUB RedrawPossList
   LOCATE TopRow + 3, LftCol + 2, Ø
   TempKnown$ = KnownList$
   FOR Lp = 1 TO 26
      Char$ = CHR$(Lp + ASC("A") - 1)
      IF INSTR(TempKnown$, Char$) THEN
         COLOR Known, Background, Background
      ELSEIF MID$(PossList$, Lp, 1) = " " THEN
         COLOR Normal, Background, Background
      ELSE
         COLOR Exclude, Background, Background
      END IF
      PRINT CHR$(Lp + ASC("A") - 1); " ";
   NEXT Lp
END SUB
```

End

PROGRAM LISTING 8. KNWNLIST.BAS keeps track of the list of letters that the user knows are in the secret word and lets the user modify the list.

```
' $INCLUDE: 'J.INC'

DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol
DIM SHARED KnownLetters AS STRING * 5, KnownCount

SUB InitKnownList
   CALL BoxCoords(KnownBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol
   KnownLetters$ = " "
   KnownCount = Ø
   NormalBox (KnownBox)
   COLOR Normal, Background, Background
   LOCATE TopRow + 1, LftCol + 2, Ø
   PRINT "Known Letters";
   COLOR Dark, Background, Background
   LOCATE TopRow + 3, LftCol + 6, Ø
   PRINT "-----";
END SUB

SUB ChangeKnownList
   ShowMessage ("Enter letter, Backspace to erase, <TAB> for next box, <Return> to guess")
   HighlightBox (KnownBox)
   Row = TopRow + 3
   Col = LftCol + 6
   DO
      COLOR Dark, Background, Background
      LOCATE Row, Col + KnownCount, 1, Ø, 7
      DO
         Char$ = INKEY$
      LOOP UNTIL LEN(Char$)
```

Listing 8 continued ►

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a. Your Personal Information

Requested Line of Credit $_____

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Date of Residence: Month Year **Monthly Payment:** $ Buy ☐ Rent ☐ Other ☐

Previous Address: **Dates of Residence:** From To

Your Employer: (If self-employed, see rear panel.) **Date of Employment:** Mo. Yr. **Position:** **Monthly Income:** Gross $ Net $

Employer's Address: Street City State **Business Phone:** ( ) –

Previous Employer: **Address:** **Dates of Employment:** From To

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Bank Account: ☐ Checking ☐ Savings

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Bank Card Reference: ☐ VISA ☐ Mastercard		
Other Credit Card Reference		
Other Credit References: Account No.: Expires:		

Driver's License No. State: Expires:

c. Joint Applicant's Personal Information

*If you are a married Wisconsin applicant, you must provide your spouse's information below, even though your spouse may not be signing this contract.

Joint Applicant's Name: First Initial Last **Date of Birth:** Mo. Day Yr. **Social Security Number:**

Address Street Apt. # City State Zip **Date of Residence:** Mo. Yr. **Home Phone** ( ) –

Employer: **Date of Employment:** Mo. Yr. **Position:** **Monthly Income:** Gross $ Net $

Employer's Address: Street City State **Business Phone:** ( ) –

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Listing 8 continued

```
      IF Char$ = CHR$(13) THEN                          'Carriage return
         COLOR Normal, Background, Background
         NormalBox (KnownBox)
         EXIT SUB
      ELSEIF Char$ = CHR$(9) THEN                       'TAB
         COLOR Normal, Background, Background
         NormalBox (KnownBox)
         ChangePossList
         EXIT SUB
      ELSE                                              'Changes in this box
         IF Char$ = CHR$(8) AND KnownCount > 0 THEN     '  Backspace
            MID$(KnownLetters$, KnownCount, 1) = " "
            KnownCount = KnownCount - 1
            LOCATE Row, Col + KnownCount, 0
            PRINT "-";
            LOCATE Row, Col + KnownCount, 1, 0, 7
            COLOR Normal, Background, Background
            RedrawGuessList
            RedrawPossList
         END IF
         Char$ = UCASE$(Char$)                          '  Other characters
         IF Char$ >= "A" AND Char$ <= "Z" AND KnownCount < 5 THEN
            COLOR Known, Background, Background
            PRINT Char$;
            KnownCount = KnownCount + 1
            MID$(KnownLetters$, KnownCount, 1) = Char$
            COLOR Normal, Background, Background
            RedrawGuessList
            RedrawPossList
         END IF
      END IF
   LOOP
END SUB

FUNCTION KnownList$
   KnownList$ = KnownLetters$
END FUNCTION
```

End

PROGRAM LISTING 9. MSGBOX.BAS takes care of the message box and allows temporary saving of messages on a message stack.

```
' $INCLUDE: 'J.INC'

' $DYNAMIC
DIM SHARED MessageStack$(1)
DIM SHARED StackPtr, Blank$
DIM SHARED MyBox AS BoxType, TopRow, BotRow, LftCol, RtCol

SUB InitMessage
   CALL BoxCoords(MessageBox, MyBox)
   TopRow = MyBox.TopRow
   BotRow = MyBox.BotRow
   LftCol = MyBox.LftCol
   RtCol = MyBox.RtCol
   MaxLen = RtCol - LftCol - 1
   Blank$ = STRING$(MaxLen, " ")
   StackPtr = 1
   REDIM MessageStack$(1 TO 10)
   NormalBox (MessageBox)
END SUB

SUB PushMsg
   IF StackPtr <= 10 THEN
      MessageStack$(StackPtr) = Blank$       'Last message printed
      StackPtr = StackPtr + 1
   END IF
END SUB

SUB PopMsg
   IF StackPtr > 1 THEN
      StackPtr = StackPtr - 1
   END IF
   ShowMessage (MessageStack$(StackPtr))
END SUB

SUB ShowMessage (Msg$)
   Temp$ = Msg$
   IF LEN(Temp$) < LEN(Blank$) THEN
      Temp$ = STRING$((LEN(Blank$) - LEN(Temp$)) / 2, " ") + Temp$
   END IF
   LSET Blank$ = Temp$
   COLOR Normal, Background, Background
   LOCATE TopRow + 1, LftCol + 1, 0
   PRINT Blank$;
END SUB
```

End

PROGRAM LISTING 10. BOXES.BAS creates and highlights the boxes on the screen and keeps track of the box coordinates.

```
' $INCLUDE: 'J.INC'

BoxDefs:    'Size/position for various boxes
   DATA   4, 15,  1, 22   : 'Guess List Box
   DATA  19, 32,  1,  5   : 'Guess Box
   DATA  41, 57,  1,  5   : 'Known Box
   DATA  65, 73,  1,  5   : 'Score Box
   DATA  19, 73,  8, 12   : 'Excluded Letters Box
   DATA  19, 73, 15, 20   : 'Used Letters Box
   DATA   1, 79, 23, 25   : 'Message Box
   DATA  20, 60, 11, 13   : 'Another Game Box

DIM SHARED Box(1 TO MaxBox) AS BoxType

SUB InitBoxes
   RESTORE BoxDefs
   FOR Lp = 1 TO MaxBox
      READ Box(Lp).LftCol, Box(Lp).RtCol
      READ Box(Lp).TopRow, Box(Lp).BotRow
   NEXT Lp
END SUB

SUB MakeBox (BoxNum, Clr)
   COLOR Clr, Background, Background
   LftCol = Box(BoxNum).LftCol
   RtCol = Box(BoxNum).RtCol
   TopRow = Box(BoxNum).TopRow
   BotRow = Box(BoxNum).BotRow
   Htemp$ = STRING$(RtCol - LftCol - 1, 205)
   LOCATE TopRow, LftCol, 0
   PRINT CHR$(201); Htemp$; CHR$(187);
```

Listing 10 continued ►

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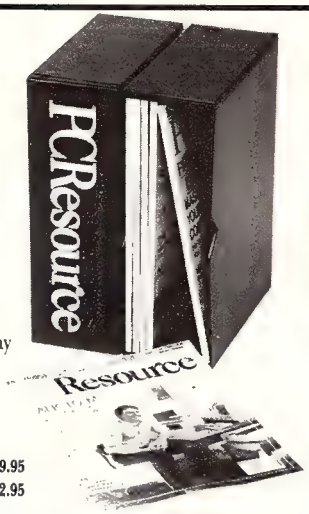

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Listing 10 continued

```
   FOR Lp = TopRow + 1 TO BotRow - 1
      LOCATE Lp, LftCol, Ø
      PRINT CHR$(186);
      LOCATE Lp, RtCol, Ø
      PRINT CHR$(186);
   NEXT Lp
   LOCATE BotRow, LftCol, Ø
   PRINT CHR$(2ØØ); Htemp$; CHR$(188);
END SUB

SUB HighlightBox (BoxNum%)
   CALL MakeBox(BoxNum%, HighLight)
END SUB

SUB NormalBox (BoxNum%)
   CALL MakeBox(BoxNum%, Normal)
END SUB

SUB BoxCoords (BoxNum%, CallBox AS BoxType)
   CallBox = Box(BoxNum)
END SUB
```

End

PROGRAM LISTING 11. WORDS.BAS handles the word list and picking the secret word.

```
' $INCLUDE: 'J.INC'

REDIM SHARED WordList(1) AS STRING * 5
DIM SHARED PickedWord$, WordCount

FileError:
   CLS
   PRINT "Error trying to read WORDS.JOT file"
   PRINT "Program stopping."
   END

SUB InitWordList
   OPEN "WORDS.JOT" FOR INPUT AS 1
   WordCount = Ø
   DO UNTIL EOF(1)
      LINE INPUT #1, Word$
      Word$ = RTRIM$(Word$)
      IF LEN(Word$) = 5 THEN WordCount = WordCount + 1
   LOOP
   CLOSE #1
   REDIM WordList$(1 TO WordCount)
   OPEN "WORDS.JOT" FOR INPUT AS 1
   Posn = Ø
   DO UNTIL EOF(1)
      LINE INPUT #1, Word$
      Word$ = UCASE$(RTRIM$(Word$))
      IF LEN(Word$) = 5 THEN
         Posn = Posn + 1
         WordList$(Posn) = Word$
      END IF
   LOOP
   CLOSE #1
END SUB

SUB PickAWord
   RANDOMIZE TIMER
   DO
      Pick = INT(RND(1) * WordCount) + 1
      PickedWord$ = WordList$(Pick)
   LOOP WHILE LEN(PickedWord$) <> 5
END SUB

FUNCTION SecretWord$
   SecretWord$ = PickedWord$
END FUNCTION
```

End

PROGRAM LISTING 12. JOTS.MAK works with a Make utility to create the complete program automatically.

```
# Make file for JOTS.EXE

.bas.obj:
   BC $*.BAS /O;

words.obj:        words.bas      j.inc

guess.obj:        guess.bas      j.inc

gueslist.obj:     gueslist.bas   j.inc

score.obj:        score.bas      j.inc

usedlist.obj:     usedlist.bas   j.inc

posslist.obj:     posslist.bas   j.inc

knwnlist.obj:     knwnlist.bas   j.inc

msgbox.obj:       msgbox.bas     j.inc

boxes.obj:        boxes.bas      j.inc

main.obj:         main.bas       j.inc

jots.exe:         words.obj      guess.obj      gueslist.obj   score.obj  \
                  usedlist.obj   posslist.obj   knwnlist.obj   msgbox.obj \
                  boxes.obj      main.obj
         Echo off
         Echo /E main   +  > jots.lnk
         Echo words     + >> jots.lnk
         Echo guess     + >> jots.lnk
         Echo gueslist  + >> jots.lnk
         Echo score     + >> jots.lnk
         Echo usedlist  + >> jots.lnk
         Echo posslist  + >> jots.lnk
         Echo knwnlist  + >> jots.lnk
         Echo msgbox    + >> jots.lnk
         Echo boxes       >> jots.lnk
         Echo jots.exe;   >> jots.lnk
         LINK @jots.lnk
```

End

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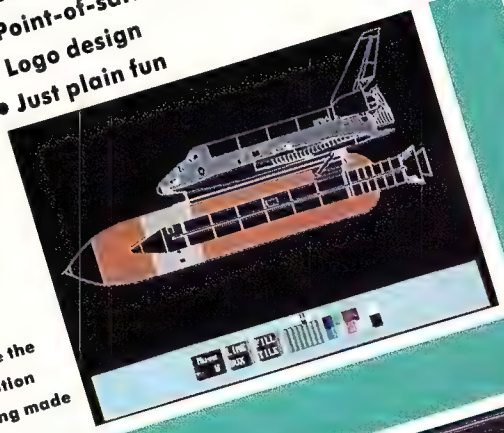

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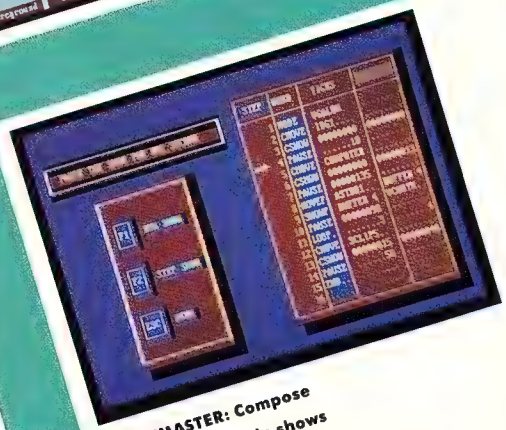

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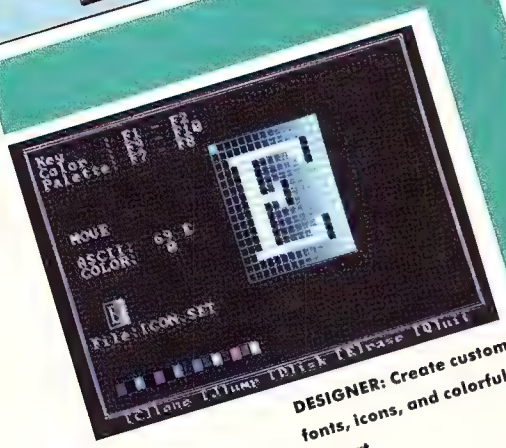

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❑ **DESIGNER**, a full-featured font and clip-art design package for use with Painter. Create a library of custom text fonts, icons, and clip art. Or use the three predesigned fonts included in the program.

❑ **TEXTART**, a professional text-screen designer. Design, store, and display text screens in 16 colors. Use the Textart screens with Showmaster or with your own Basic or C-language programs.

❑ **SHOWMASTER**, a tool for creating graphics presentations. Build presentations from pictures, graphics, charts, or from clippings you create with other Showmaster programs. Use special effects such as wipes and fades to move between screens. Showmaster includes its own easy-to-use presentation program language (PPL). A few keystrokes is all it takes to construct your show.

❑ **GRABBER**, a memory-resident utility that captures text and graphics from virtually any program.

❑ **CONVERT**, a utility that converts Showmaster Plus screens to the popular PC Paintbrush (.PCX) file format.

These programs would sell alone for more than $50 each. But for the *PC Resource* reader, all five programs and a utility are yours for the exceptional value of $49.95.

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System requirements: IBM-compatible systems; MS-DOS 2.0 or later; 640K RAM; CGA, EGA, or VGA adapter with 256K RAM; hard drive recommended but not required. Supports IBM, Epson, or HP Laserjet Series II graphics printers. Binary or PC Paintbrush (.PCX) format supported.

All screen files and fonts compatible with the original Showmaster II.

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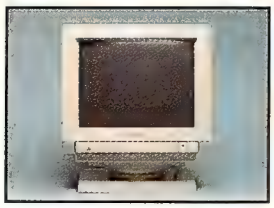

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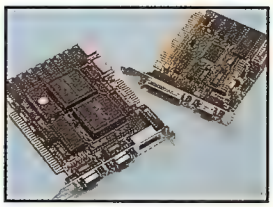

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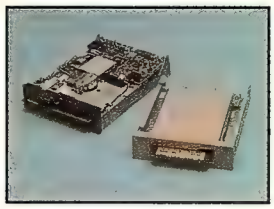

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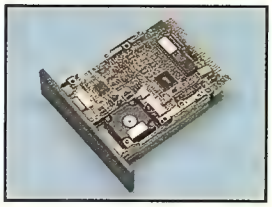

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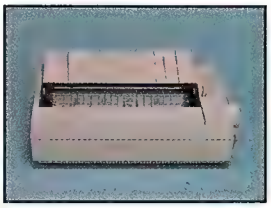

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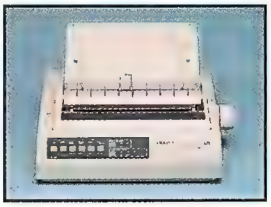

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P5300 (265cps, 132 col, 24-pin) ... $689

Toshiba

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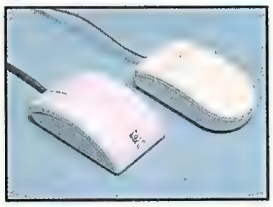
MICE



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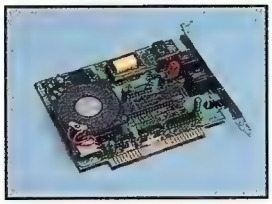

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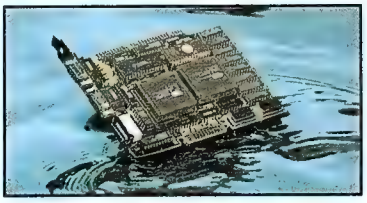

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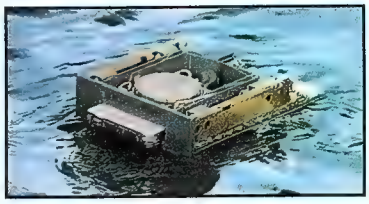

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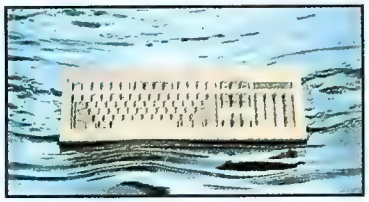

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EGA	1,169	1,249	1,445	1,575

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DRIVES	20MB	40MB-40MS	40MB-28MS	80MB-28MS
MONOCHROME	1,299	1,425	1,483	1,711
EGA	1,769	1,895	1,953	2,181
VGA	1,901	2,027	2,085	2,313

386/20MHz	1MB, Hard disk, Monitor & Video card			
DRIVES	40MB-40MS	40MB-28MS	80MB-28MS	116MB-28MS
MONOCHROME	2,299	2,358	2,591	2,685
EGA	2,867	2,926	3,159	3,253
VGA	3,002	3,061	3,294	3,388

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Circle 415 on Reader Service card.

REVIEWS

1 *Unacceptable* **2** *Worse than average* **3** *Works as it should*
4 *Better than average* **5** *Superlative*

117 **Words & Figures 1.01, #Cruncher**
Low-priced spreadsheet alternatives.

119 **PC Tools Deluxe 5.1**
A popular utility gets even better.

121 **Grandview 1.01**
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Low-priced spreadsheet alternatives

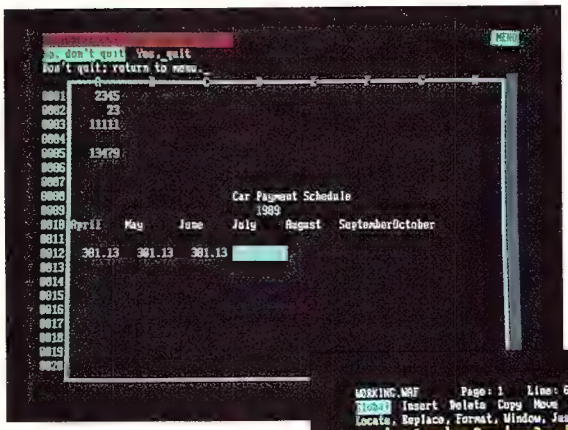
Words & Figures 1.01, #Cruncher

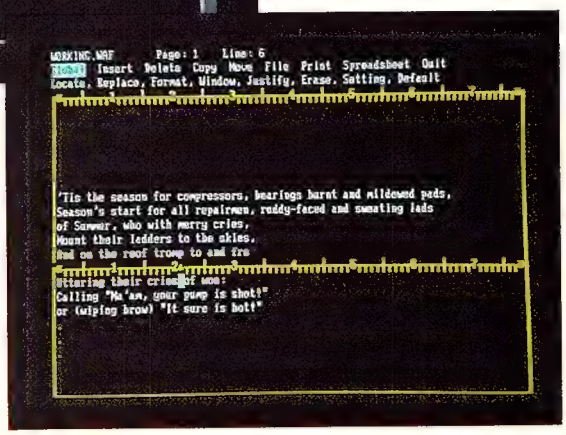
WHO NEEDS ANOTHER spreadsheet package? You might, especially if it works well, costs a fraction as much as the high-priced brands, and performs most of the tasks an average user needs a spreadsheet to do.

Two low-priced competitors, Words & Figures and #Cruncher, may appeal to those who have a spreadsheet at the office but need to take work home. It may be equally attractive to those small businesses or home users who don't need the power or confusion of Lotus 1-2-3, Supercalc, or Excel. If you need only the classic financial statements, budgets, or amortization schedules to mind costs, track expenses, or figure costs for a new department, then either of these low-priced packages will do the job for you.

#Cruncher offers full compatibility with the Lotus standard, while Words & Figures offers only a likeness. #Cruncher also offers a few more advanced macro commands, but Words & Figures delivers a more well-rounded office tool, combining word processing with financial calculating.

Both packages cost less ►





In #Cruncher, above, and Words & Figures, at right, the menu structure, commands, and macros are similar to bigger, more expensive spreadsheets.

than $100, both offer basic graphs, and each has a unique extra in its corner. Words & Figures provides a small and a large program version that frees extra memory for larger worksheets. #Cruncher comes with a runtime version that lets you develop a blank template, complete with formulas, ready to hand to a secretary or aide for data entry.

Low-Priced vs. High-Priced

In both packages, the menu structure, commands, and macros are very similar to those of the large, more expensive spreadsheets. For someone familiar with Lotus and its bar-menu style, using one of these spreadsheets will be easy. While both products are simple to use, Words & Figures has an edge. Like most of Lifetree's products, Words & Figures is so friendly you expect it to lick your hand.

The major difference between inexpensive spreadsheets and their more expensive cousins lies in the greatly reduced number and complexity of functions provided by the small packages. A function is a built-in formula that's ready to apply to a cell or group of cells. So-called @ functions in Lotus, for example, control the addition of cells within a spreadsheet range and finding such values as logs, cosines, principals, and payments. While Lotus 1-2-3 has nearly 100 @ functions, Words & Figures and #Cruncher have 25 and 26, respectively.

The two packages are similar, though not identical, in terms of their built-in functions. #Cruncher is oriented slightly more toward financial functions—it has a built-in amortization function, for example—while Words & Figures has a bit more in the way of science and math functions, such as arc, tangent, and cosine functions. But both have sufficient power for the majority of day-to-day business applications.

Both #Cruncher and Words & Figures allow multiple cell macros, interruptible macros, single-step execution for debugging, user input during macros, auto-execute macros, and X-commands for writing programs—similar in style to Basic—using macros. #Cruncher adds a few advanced macro commands, such as Getnumber and Menubranch, that Words & Figures doesn't have.

Both packages have simple but adequate graphics: bar and line graphs and X-Y plots. Words & Figures is slightly better at graphing than #Cruncher; you have more options, and changing and editing graphs is much easier. Both packages allow you to add legends, labels, and number-format options to graphs.

Words & Figures has a good selection of recalculation choices: the usual global, manual, plus rowwise, columnwise, and "natural" recalculation. (This type of recalculation processes cells containing values that contribute to a formula before processing the cell containing the formula. While this speeds up recalculation, it may lead to circular references when cells are dependent on each other.) Words & Figures tries to compensate for this flaw with an Audit command that identifies circular references.

#Cruncher is somehat more powerful. You can set its recalc to global (automatic) or manual, and, in addition, you can select a range to recalculate and specify conditional recalculations—where a range (or the entire spreadsheet) is recalculated only when particular conditions are met.

Words & Figures offers a more dramatic feature with its word processer—a neat trick, if it works. And it does. With Words & Figures you can shift from the standard spreadsheet grid to a word processor window with a single keystroke. The word processor is fairly crude, but the fact that it is fully integrated with the spreadsheet counts for a lot. Bear in mind that Lifetree Software wrote the book on easy-to-use word processing with its Volkswriter program.

Though the programs are similar in speed, file size, and power, spreadsheet speed is both subjective and relative. It depends on the size of the spreadsheet, the level of recalculation you choose, and the number and type of calculations involved. Speaking subjectively, #Cruncher seems to have the speed edge, but neither one is a whiz, and both perform comparably to Lotus 1-2-3 when working with small- to medium-size worksheets.

What's Missing?

What don't you get in Words & Figures or #Cruncher? Well, you don't get fancy

TO GIVE YOU more information on available products, summaries of some past reviews are included in this section. Information on new versions has been included, but the ratings apply to the versions originally reviewed. The dates at the end of the capsule reviews indicate the issues in which the full reviews appeared.

BUSINESS SOFTWARE

ACTION PLANNER 1.0, $129.95 for software and leather binder; $59.95 software only. Self-described personal organizer is really a modestly endowed forms generator packed with a binder that masquerades as a computerized personal organizer. Includes more than 100 different forms that you can print or customize. Channelmark expects you to print the forms on special prepunched paper included with the program; refills are expensive. Supports only a dozen printers, including Epson and HP Laserjet. No printed manual. Requires 256K RAM, MS-DOS 2.0 or later, one or two floppy drives, and a graphics printer. Available in 5¼- and 3½-inch versions. Not copy-protected. Channelmark Corp., P.O. Box 7600, San Mateo, CA 94403, 800-851-2917 (800-223-1479 in California). (February 1989) Rating: **2**

BACK TO BASICS: PROFESSIONAL ACCOUNTING 2.0, $199. Accounting package that assumes you understand debits and credits thoroughly. Includes general ledger that holds up to 254 accounts, accounts-receivable package that can handle 700 customers, accounts-payable module that handles 500 vendors, and an invoicing module that allows you to enter inventory data when the invoice is written. No budget module, on-screen help, checkbook reconciliation, or data export. Interface is awkward; manual is very good. Requires 128K RAM, MS-DOS 2.0 or later, and two floppy drives (hard drive recommended). Not copy-protected. Peachtree Software, 4355 Shackleford Road, Norcross, GA 30093, 800-247-3224. (February 1989) Rating: **3**

CLAN PRACTICAL ACCOUNTANT, $79.95. Limited double-entry system accounting package can't print checks or distribute receipts among several accounts. You can set up only 128 accounts or categories of expenses and receipts. Keeps track of several bank accounts and lets you allocate transactions to seven departments. Has pop-up calculator. Displays useful reports such as liquid assets. Poor on-screen help. Requires 128K RAM and MS-DOS 2.0 or later. Not copy-protected. Sir-Tech Software Inc., P.O. Box 245, Ogdensburg, NY 13669, 315-393-6633. (December 1988) Rating: **2**

IN-HOUSE ACCOUNTANT 2.1, $199. This small-business accounting tool takes the mystery out of debiting and crediting accounts by doing it for you. Offers predefined account setups for different kinds of businesses, and can post recurring and automatic transactions. Includes pop-up calculator and superb help screens. Excellent user's guide and separate accounting manual with sample transactions. Requires 384K RAM and MS-DOS 2.0 or later. Not copy-protected. Migent Inc., Call Box #6, 865 Tahoe Blvd., Incline Village, NV 89450, 800-633-3444. (September 1988) Rating: **4**

touches like bar charts with three-dimensional shadings or presentation graphics. And more important, you don't have the advantage of a real database manager built into your spreadsheet (you can sort, edit and select, but it's painfully slow), and you can't link multiple worksheets.

Lotus compatibility is the cleanest divider between the two packages. Words & Figures is compatible only with Lotus 1-2-3 1a files. This means the spreadsheet won't work with files created by Lotus 1-2-3 2.0 or higher. You can export your files to a higher release version of Lotus, but only as comma-delimited ASCII files, not a totally satisfactory solution.

#Cruncher is both file- and keystroke-compatible with Lotus 1-2-3 in both releases 1a and 2.0. If you are looking for an inexpensive spreadsheet package for home use to supplement a larger package at work, you will probably want #Cruncher.

#Cruncher has a clear *User's Guide*, but at first I couldn't find the index. As it turns out, the *Quick Reference Guide* is in fact a separately bound index, broken down into Commands, @ Functions, Macros, and General sections. I'd appreciate a more traditional solution. The review package also included *The Elements of Spreadsheet Style*, an informative book by John M. Nevison, which deals with the general principles of spreadsheet construction, but is not meant expressly for use with #Cruncher.

Words & Figures includes a substantial *User's Guide* with a decent index and nice big command headings. It arrives with a few thin booklets: *Getting Started, Quick Reference Card*, and the *Customer Assurance Plan*—the largest at seven pages. It explains, among other things, Lifetree's 30-day guarantee.

Overall, #Cruncher is the slightly more powerful spreadsheet, and it's a trifle faster. I would recommend it. Words & Figures, however, is quite capable for most small- to medium-size projects. It's somewhat easier to use and has a built-in word processor.

Unless your primary concern is Lotus compatibility, Words & Figures is ideal for the very small business or for the home user who needs a general office package.

—DIANA GABALDON

Words & Figures 1.01 requires 256K RAM and DOS 2.0 or later. EGA, CGA, Hercules, or compatible graphics card required for graphs. Uses expanded memory. Not copy-protected. Thirty-day money-back guarantee. Lifetree Software Inc., 411 Pacific St., Monterey, CA 93940, 800-543-3873, $99.

Ease of use	**4.5**
Performance	**4.0**
Manuals	**4.0**
Value	**3.0**
Overall Rating	**3.9**

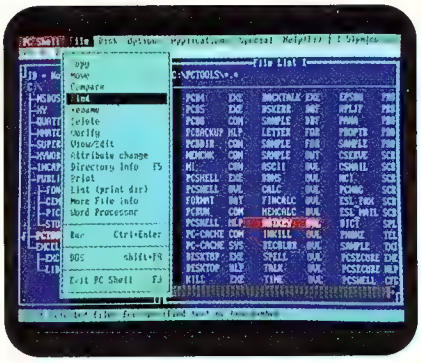
#Cruncher requires 384K RAM and DOS 2.0 or higher. EGA, CGA, Hercules, or compatible graphics adapter required for graphs. Not copy-protected. Simon & Schuster Software, a Division of Simon & Schuster Inc., One Gulf & Western Plaza, New York, NY 10023, 800-223-2336, $99.95.

Ease of use	**3.5**
Performance	**4.0**
Manuals	**3.5**
Value	**4.5**
Overall Rating	**3.9**

PC Tools Deluxe 5.1

A popular utility gets even better.

THOUGH ITS RELEASE was long overdue, Central Point Software's PC Tools Deluxe 5.1 was well worth the wait. Containing



PC Tools Deluxe 5.1 offers a shell similar to that of DOS 4.0 and a desktop accessory like Sidekick.

most of the utilities found in Norton Utilities Advanced Edition and Mace Utilities plus features found in neither of those programs, PC Tools can also boast that it's the least expensive of the three packages. ►

LOOK'& LINK, $99.95. A Lotus add-in that opens a window on a second worksheet without exiting the first. You can scroll inside the window, swap sheets between windows, and cut and paste between sheets. Develops worksheet formulas that extract information from other worksheets stored on disk or in expanded memory. Automatically consolidates related worksheets and generates an audit trail. Links worksheets as you build them or ones already created. Excellent documentation. Power users with extra-large spreadsheets are advised to purchase additional memory. Requires 320K RAM (additional RAM recommended), MS-DOS 2.0 or later, and Lotus 2.0 or 2.1. Hard drive recommended. Not copy-protected. Personics, 63 Great Road, Maynard, MA 01754, 508-897-1575. (April 1989) Rating: **4.4**

MEMO MASTER, $49.95. Memo manager with 11 ready-made formats that help take drudgery out of writing, printing, and tracking memos. Prompts you for subject, recipients, room numbers, and reply date. Generates routing slips. Its database records outgoing memos. Indexes and retrieves memos by subject or other label. Limited word processing. Imports ASCII files. Includes 32 pages of clear, indexed, on-line instructions. Requires 320K RAM and MS-DOS 2.0 or later. Not copy-protected. Channelmark Corp., P.O. Box 7600, San Mateo, CA 94403, 415-345-5900. (November 1988) Rating: **4**

PRIMETIME PERSONAL 1.2, $99.95. Time-management program that schedules appointments, creates to-do lists, and maintains a personal calendar. Works as a standalone or in memory-resident mode. Has auto-scheduling feature for regular appointments and tasks. Keeps track of your tasks as well as those of your coworkers. Has built-in autodialer and automatically sorts entries by priorities you set. Has no printer drivers and requires constant data entry to keep information current. No paper-and-pencil accessory. Requires 128K RAM, MS-DOS 2.1 or later, and one floppy drive. (Second floppy or a hard drive recommended.) Not copy-protected. Primetime Software Inc., P.O. Box 27967, Santa Ana, CA 92799, 800-777-8860. (February 1989) Rating: **3**

QUICK SCHEDULE PLUS, $69.95. Displays, edits, and redraws schedules for short-term and long-range projects. Based on a blank timeline calendar that scrolls left to right across the screen, or use a traditional grid calendar. You input tasks and subtasks with time frames. View entire projects on a scale of days, months, or years, or zoom in on one day. For each task you can attach a note of reminders and details. Requires 384K RAM and MS-DOS 2.0 or later. Not copy-protected. Power Up/Channelmark Corp., P.O. Box 7600, San Mateo, CA 94403, 415-345-5900. (November 1988) Rating: **4**

WHO/WHAT/WHEN 1.08, $189.95. Time-management software that keeps track of people, appointments, and schedules. Has appointment calendar and card file for names, addresses, numbers, and general information; a project scheduler; and a pop-up calculator. Generates Gantt charts of your projects, listing tasks, milestones, and due dates. Comes with "Paperware," a set of daily and monthly appointment/event forms and tabbed dividers that you fill out and later enter into your

Central Point Software has added several intriguing utilities to an already impressive package. Probably the two most important are a shell, similar to that of DOS 4.0, and a desktop accessory, much like Sidekick. Many of PC Tools' existing utilities have also been improved, including its file and format recovery, file backup, and disk optimization.

DOS Insulator

Like most shells, PC Tools now offers you a respite from DOS commands, its syntax, and even the necessity to type filenames. But PC Tools has the edge over other shells I've seen with both its interface and the number of its functions.

When you load the DOS shell, you're presented with an attractive screen that, like DOS 4.0, lists your subdirectories in a window to the left and the files in the subdirectory you've selected in a window to the right. You move between windows by pressing the Tab key or by clicking inside the respective window with your mouse. To move from one subdirectory to another or from one file to another, you can use the arrow, Home, End, PgUp, or PgDn keys or a mouse. Over 30 separate file and disk management tasks are listed in five pull-down menus across the top of the screen, fully insulating you from DOS.

For instance, to move a file from one subdirectory to another using the keyboard, you first move to the source subdirectory with the cursor keys. Then, in succession, you press Tab to switch to the window in which your files are listed, highlight the file you want to move, press F to pull down the File menu, and hit M for Move.

PC Tools then asks you to verify that you want to delete the file from the source subdirectory, which you can do by hitting Enter. The last two steps are to select the target drive and target subdirectory.

One particularly handy feature of the DOS shell is the application launcher. Acting as a mini menu system, it allows you to quickly load other programs.

To use the application launcher, you have to first build the Applications menu. You do this by typing in the commands you normally use to load your application programs and by highlighting one letter in each program's name. Unlike Automenu or other full-fledged menu systems, you can include only 20 programs. Being able to go to a submenu with other programs would be helpful.

To load a program, you simply press A, which pulls down the Applications menu, and then press the letter you previously highlighted in the program's name. To make things even easier, you can configure PC Tools to automatically pull down the Applications menu whenever you boot up your computer.

The second major upgrade to PC Tools is the desktop manager. Among other things, the desktop manager lets you build a small database of names and addresses, telecommunicate, check your appointment schedule, create an outline, write a memo, and do three different types of calculations. By making the desktop manager RAM-resident (a PC Tools option), you can perform these tasks within other programs.

PC Tools has many options, and you can customize it to the way you work. You can make both the DOS shell and desktop manager resident or nonresident, run the DOS shell from the desktop manager or the desktop manager from the shell, alter the amount of memory the shell uses when resident or nonresident, customize the size of the windows, and much more.

Naturally, all these options can be confusing at first, and it may take some experimenting before you decide which are best for your system. Context-sensitive online help and a well-organized manual will help you find your way around PC Tools. However, if you have a question about the program, it's difficult—if not impossible—to get through to technical support.

There are also a few small quirks in the program itself. For instance, although you can quickly switch subdirectories in the shell from the keyboard, it is almost too quickly. If you leave the cursor on a subdirectory name for even a second, the program loads those files.

If it's not the one you wanted, you have to wait a second or two until that subdirectory's files are listed before you can continue to move down the list of subdirectories. And when you want to test your disk for bad sectors and move data if necessary, you have to begin the disk optimization routine, pull down the Analysis

computer. Includes RAM-resident alarm that pops up and beeps amidst any application. Requires 512K RAM (640K recommended), a hard drive, and MS-DOS 2.1 or later. Supports expanded memory. Not copy-protected. Chronos Software Inc., 1500 16th St., Suite 100, San Francisco, CA 94103, 800-777-7907 (415-626-4244 in California). (January 1989) Rating: **3**

DATABASES

ASK SAM 4.1, $295. The latest version of this speedy free-form database has hypertext links and dialog boxes. Records are screenfuls of text that you can locate quickly and link to other records. You can design records with 10 templates. Saves complex report formats as program records, which you can call up and execute later. Allows you to design pop-up dialog boxes. Hypertext lets you perform global searches across multiple files. While not relational, it lets you keep two files open at once and move or copy data between them. Clear reference manual. Requires 256K RAM, MS-DOS 2.0 or later, and one floppy drive (hard drive recommended). Not copy-protected. Ask Sam Systems, P.O. Box 1428, Perry, FL 32347, 904-584-6590. (April 1989) Rating: **3.8**

IZE 1.0a, $445. A free-form, text-based database, which, through its word processing, database, outline-processing, text-searching, and hypertext features, organizes and searches anything you can type, import, or link to it. Records are called notes and can be short reminders or full-fledged documents. Ize organizes its searches of notes into outlines with the main headings and subheadings based on the frequency with which designated keywords in your notes appear throughout the textbase. Once the initial outline is displayed, you can highlight and select subheads for more detailed analysis. Supports expanded memory. Requires 512K RAM, MS-DOS 2.0 or later, and a hard drive. Not copy-protected. Persoft Inc., 465 Science Drive, Madison, WI 53711, 608-273-6000. Version 1.0b is now out; it features password protection and more hot-link drivers. (April 1989) Rating: **3.9**

MEMORY MATE, $69.95. RAM-resident, free-form, text-based database manager consisting of any note, memo, reminder, or other documents up to 120 lines long. Indexes every word in every record for fast and flexible searches. Imports and exports ASCII files, and uses hypertext to link records. Comes with first-rate instruction manual. Hard disk recommended. Requires 88K RAM. Not copy-protected. Broderbund Software Inc., 17 Paul Drive, San Rafael, CA 94903, 800-527-6263 (415-492-3500 in California). (October 1988) Rating: **4**

REFERENCE FILE, $89. Memory-resident database with adjustable on-screen window that shares the screen with your application. Handles multiple databases one at a time. Searches files with up to 30 million variable field records; each record can be 60K long. Accepts integers, dates, and text for fields, and all can be indexed. Can import Dbase, DIF, and ASCII files. Includes a thorough manual. Requires 512K RAM (135K for its memory-resident engine), a hard drive, and MS-DOS 2.0 or later. Not copy-protected. Reference Software Inc., 330 Townsend St., San Francisco, CA 94107, 800-872-9933 (415-541-0222 in California). (September 1988) Rating: **4**

menu, and select Surface Analysis. I'd rather be able to move to Surface Analysis directly.

All told, PC Tools is an excellent package. It may not have all the technical razzle-dazzle of Norton or Mace: You can't, for instance, create interactive batch files or automatically protect files in memory from a power outage or system lockup. But with its new DOS shell and desktop manager, PC Tools outdoes both Norton and Mace. And you can't beat the price.

At press time, Central Point Software was preparing an update that, among other things, would improve its file-viewing features.

Ease of use	**4.5**
Performance	**4.5**
Manuals	**4.5**
Value	**5.0**
Overall Rating	**4.6**

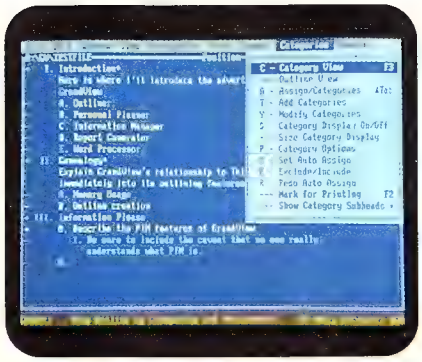
—REID GOLDSBOROUGH

Requires 512K RAM (as a standalone program), MS-DOS 2.0 or later (3.2 or later is recommended), and one floppy drive (hard drive recommended). Not copy-protected. Central Point Software, 14220 N.W. Green Brier Parkway, Suite 200, Beaverton, OR 97006, 503-690-8090, $79.95.

Grandview 1.01

An outliner in transition.

GRANDVIEW IS ONE of those software packages you have to live with a while before you can truly appreciate it. Grandview promises so much—outlining, information management, personal planning, word processing, and report generation—that it's no easy task to decide how best to use the package and then assess how well each of its modules is working.



Grandview uses drop-down menus to initiate most of its operations.

Grandview has a respected genealogy. As a direct descendent of Symantec's Think Tank, a popular outline processor, its outlining features are impressive. But, I can't imagine anyone using Grandview as a word processor for a lengthy-project.

As a personal information manager, Grandview compares favorably to the competition, usually manifesting one advantage at the expense of something else. For example, Grandview is easier to learn but not as powerful as Agenda from Lotus Development Corp. It's less intuitive but more structured than IZE from Persoft. It's less restricted but more expensive than Who-What-When from Chronos.

OUTLINE LIMITED BY RAM

Grandview uses drop-down menus to initiate most of its operations. When you first open a Grandview outline, the screen displays a single Roman numeral one (I). This is where you enter your initial top-level heading, as well as any explanatory text, or a note that you want associated with the outline. These notes are available for every heading. The number of levels you can assign to a Grandview outline is virtually limitless. All headings and subheadings are automatically indented and tagged with the standard letter and number sequences. The outline is so automatic that the only way you can create a second Roman numeral is to use the Divide Headline command buried in the reorganize menu.

Other menu options and special keystrokes let you expand or collapse an outline (hide and reveal single headings or sections of an outline), promote and demote headings (move them up or down one level within an outline), reorganize headings within the same level, or delete an outline level and all its associated subheadings. Whenever you change your outline, Grandview automatically reformats and renumbers all affected levels and headings appropriately. As I said earlier, the outline features of Grandview are impressive.

The only practical limit to the size and complexity of a Grandview outline and its ►

LANGUAGES

POP BASIC 2.02, $129.95. Pop Basic Interpreter, $79.95. Pop Basic Compiler and Interpreter, $129.95. Unique, fun, memory-resident version of Basic that lets you create your own pop-up, memory-resident calculator, notepad, or clipboard programs. Consists of an interpreter with an editor and debugging tools, and a compiler that translates your program's source code into fast execution "pseudo-code." A linking utility on the compiler disk turns your compiled pop-up into a standalone program. Not for beginners. Requires 320K RAM (512K recommended) and one floppy drive. Not copy-protected. Hedge Systems, 511 W. Glenoaks Blvd., Glendale, CA 91202, 818-243-2235. (October 1988) Rating: **5**

SMALLTALK/V 2.0, $100. Language extension packs (five available), $50 each. Easy, window-oriented programming language a novice could use. Build on Smalltalk's language kernel by creating "classes" of data, then teach that data "methods" (comparable to subroutines in procedural languages) of responding to messages and commands. Data classes may incorporate several data types, strings, variables, and real numbers. Includes many predefined data classes and methods. Does not create standalone applications. Limited text editor. Requires 512K RAM, MS-DOS 2.0 or later, a graphics adapter, and two floppy drives. (EGA or higher-resolution graphics adapter, hard drive, and mouse recommended.) Not copy-protected. Digitalk Inc., 9481 Airport Blvd., Los Angeles, CA 90045, 213-645-1082. (November 1988) Rating: **3**

TURBO PASCAL 4.0, $99.95. High-level, low-cost programming language for intermediate programmers has ability to compile programs greater than 64K by linking them. Offers context-sensitive help, central menu screen, and full set of function keys defined by a status line across bottom of screen. Has Wordstar-like command-based editor. Lacks a debugger. Execution speed improved over Version 3.0, and program size cut in half. Requires 384K RAM, MS-DOS 2.0 or later, and one 360K floppy drive. Supports all display adapters. New version of 4.0 Turbo Pascal now available for $149.95 ($49.95 for upgrade). Borland International Inc., 1800 Green Hills Road, Scotts Valley, CA 95066, 408-438-8400. (November 1988) Rating: **4**

HARDWARE ADD-ONS

ASTRO EXT/AT-HD, $348. An external, 3½-inch drive kit. Comes with its own 12-volt power supply, sturdy metal enclosure that houses a Mitsubishi-made drive, and an adapter card. Once installed, offers good performance, but drive is noisy. Kit also includes utility software and is covered by a one-year parts-and-labor warranty. Manual is poorly written and thoroughly confusing. Requires a half-card expansion slot and an AT floppy controller for either 720K or 1.44MB operation, or a PC/XT controller for 720K operation only. Astro Systems Inc., 807 Also Ave., Santa Clara, CA 95054, 408-727-5599 extension 7626. (April 1989) Rating: **2.9**

MANZANA MODEL MDQ HOST-POWERED PLUS, $374.95. An external, 1.44MB/720K, 3½-inch disk drive that attaches directly to your computer's power supply. Built around a Sony drive, its adapter card can handle multiple drives: two internal or one inter-

accompanying notes is the amount of RAM remaining after the program claims the 220K or so it needs to run. (On a 640K machine running DOS 3.3, you're left with about 370K.) Since Grandview does not currently recognize extended or expanded memory, you need to be aware of, though not overly concerned with, the program's memory constraints.

Information, Please

Grandview includes several features that place it firmly within the fuzzy software category of information manager. When working in Grandview, you can reorganize information in many ways. For example, you can view a project that you had outlined by the names of the persons working on it. Or you can automatically delegate tasks to specific departments as you enter information in a Grandview outline.

These tasks are assigned to categories, which you set up. Each category can also have multiple subcategories. In an outline for a construction project, for example, you might create separate categories for Activity Type, Personnel, Critical Dates, and Resource Allocation. You could further refine the Personnel category by defining three types of personnel: Management, Supervision, and Labor. After a category is created, it's a simple procedure to assign individual headings within your Grandview outline to that category. For example, you could assign all outline headings containing references to on-site foremen to the Supervision subcategory of Personnel. You can define up to 20 separate categories for each Grandview outline.

Pressing the F3 key switches you to Category View. Here, Grandview displays a listing of any categories created for the current outline. Highlight a given category or subcategory with the arrow keys, and all outline headings assigned to it are displayed. Highlighting the Supervision subcategory created in the previous scenario, for example, would allow you to quickly identify all outline headings referencing your on-site foremen.

If you select one of these headings and press F3 again, the program returns to Outline View, automatically placing you at the specified outline heading.

Don't kid yourself, though—Grandview requires that you do some thinking about your information and how each item or project should link to another before you can really make use of its category functions.

The one area in which Grandview falls short of its aspirations is in the realm of word processing. Admittedly, the program's Document View features are adequate for composing short memos, and they're especially well suited for producing structured proposals. To its credit, Grandview even includes a 100,000-word spell-check dictionary. Since this dictionary is stored in ASCII format, it's easy to customize. You might, for example, add unusual words that appear frequently in your outlines or documents.

In truth, a Grandview Document is really nothing more than expanded text—a brief report or memo—attached to an outline heading. I simply can't imagine using Grandview for any serious writing.

In contrast, Grandview's print features are top-notch. The program includes drivers for a variety of dot-matrix and laser printers, with an impressive number of formatting commands for all of them.

Little Things That Count

Grandview includes a number of minor amenities that, taken together, enhance the program's overall appeal. For example, the booklet that accompanied my Version 1.01 upgrade described how to configure Grandview to run under a number of popular operating environments, including Windows and Desqview. It also warned me about several compatibility problems that have surfaced when previous versions of Grandview were used with specific hardware products.

Right now, I can't see Grandview replacing IZE as my information manager of choice. I still need the free-form organization that IZE offers me. Grandview, with its emphasis on outlines and preplanning, is a little too structured for my work habits. Still, I wouldn't hesitate to recommend Grandview to others. It's everything you'd ever want in an outliner, with information management thrown in.

Ease of use	**3.5**
Performance	**4.0**
Manuals	**3.5**
Value	**4.0**
Overall Rating	**3.8**

—Jack Nimersheim

nal and one external 3½-inch drive. Performs quietly and efficiently. Manual is well written and nicely illustrated. Kit also includes drive enclosure, connecting cable, Y power cable, utility software, and a one-year parts-and-labor warranty. Requires a half-card expansion slot and an AT floppy controller for either 720K or 1.44MB operation, or a PC/XT controller for 720K operation only. Manzana Micro Systems Inc., 7334B Hollister Ave., P.O. Box 2117, Goleta, CA 93118, 805-968-1387. (April 1989) Rating: **3.8**

PARADISE AUTOSWITCH MONOCHROME EGA CARD, $279. Graphics board runs CGA and EGA color software on your monochrome monitor. Handles EGA's 640- by 350-pixel resolution and converts its colors to 16 shades of gray. In its color simulation mode, the card automatically senses EGA and CGA programs and switches between them. Easy to install. Has special drivers that let Lotus 1-2-3, Symphony, and Framework II display 132 columns on screen, but this tiny-text mode does not work with many other programs. Requires 8-bit expansion slot and a monochrome monitor. Includes parallel port. Paradise Systems Inc., 800 E. Middlefield Road, Mountain View, CA 94043, 415-960-3353. (January 1989) Rating: **3**

OPERATING ENVIRONMENTS

DESQVIEW 2.22, $129.95 (Version 2.24 now shipping). Multitasking, multiprocessing program that runs two or more programs at once. Keeps programs in active memory, so that standalones like Dbase or Xywrite behave much like pop-ups, callable with a few keystrokes. Its cut-and-paste utility moves copy between applications. Certain EGA systems and mouse users may have difficulty with the program. Includes comprehensive 206-page manual. Requires 640K RAM (swaps programs out to disk if you run out of RAM), MS-DOS 2.0 or later, and a hard drive. Complies with Expanded Memory Specification. Not copy-protected. Quarterdeck Office Systems, 150 Pico Blvd., Santa Monica, CA 90405, 213-392-9851. (April 1989) Rating: **3.4**

PERSONAL INFORMATION MANAGER

AGENDA, $395. Free-form database records your information as categories (labels of up to 69 characters), items (up to 350 characters long), or notes (up to 10K of text). By combining the above, it composes views that let you look at your database in a number of ways. Lets you assign dates to items so you can view them according to when they are entered, when they are supposed to happen, or when they are completed. Artificial intelligence interprets dates from phrases. Imports ASCII files and includes a macro language. Printer functions are limited. Has 14 printer drivers. Provides two pop-up accessories and context-sensitive help. Requires 512K RAM (640K recommended), MS-DOS 2.0 or later, and a hard drive. Not copy-protected. Lotus Development Corp., 55 Cambridge Parkway, Cambridge, MA 02142, 800-635-6887. (February 1989) Rating: **4**

WORD PROCESSORS

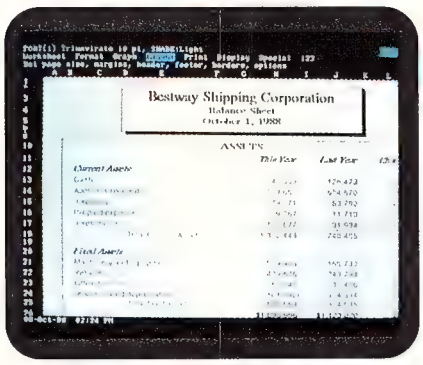
BEYOND WORD WRITER 1.1, $199. Feature-laden word processor for all but the most sophisticated user. Offers interesting tools such as a punctuation

Grandview 1.01 requires 320K RAM, MS-DOS 3.0 or later, and dual floppy drives (hard drive recommended). Not copy-protected. Symantec, 117 Easy St., Mountain View, CA 94043, 415-964-6300, $295.

Allways 1.0

Gourmet printouts from meat-and-potatoes spreadsheets.

IF YOU'D LIKE to put some spice into your otherwise bland Lotus 1-2-3 spreadsheet printouts, Allways is an add-in that



Allways lets you add type treatments to your Lotus 1-2-3 spreadsheet printouts.

lets you use boldface, underlining, proportional typefaces, and shaded areas and boxes in cell ranges. It even lets you print a graph on your spreadsheet. Allways can print in color, if your printer allows it, and, for the first time, it gives you limited access to some Postscript printers.

Even if you have only a stodgy dot-matrix printer, Allways will use its graphics mode to generate—slowly—the most impressive special effects. Coupled with a laser printer, the results are really spectacular. The program works well in text mode, but in its graphics mode, you enter another world. Allways gives you what-you-see-is-what-you-get (WYSIWYG) screens, so that your ordinary Lotus screens show the fonts you've chosen in the size and weight you've asked for—bold, centered, and 14-point Times, for example.

Allways lets you use up to eight fonts in a spreadsheet. A font is a particular typeface with a particular size and attribute. In other words, 10-point bold Triumvirate would be a separate font. Allways comes with three soft typefaces built in—Times, Courier, and Triumvirate. You can specify Times and Triumvirate in sizes ranging from 5 points to 24 points. The Courier sizes range from 5 points to 14 points.

Loads Automatically

Installing Allways is easy. You answer a few questions about the equipment you have, and the program installs the Lotus Add-In Manager and loads automatically every time you use 1-2-3.

You can enter the Add-In Manager and cancel the automatic loading, but you shouldn't do that unless your computer is short on memory. The reason is that Allways operates by creating a companion file to your spreadsheet that contains your formatting instructions. When Allways is attached, it constantly updates that companion file to enter any changes you've made—deleting rows or columns or moving a range from one location to another.

Allways is completely menu-driven. Its central nerve is the Format command. From here, you select your fonts as well as special effects—shading, boxes, and underlining.

In Allways, users who have graphics cards will immediately see their spreadsheets displayed not in the normal computer screen font but in the default proportional font Allways supplies. This is 10-point Triumvirate.

If you move the cursor to the heading of your spreadsheet and press the slash (/) key to call up the Allways main menu, you can select the Format option from eight available main commands, followed by Font from the next submenu. The next pull-down menu will offer you the entire default font set of eight choices. If you choose 20-point Triumvirate, Allways asks you for the range to which the command should be applied. By marking the heading and then pressing Return, only the heading will appear in 20-point type, twice as large as the body of your spreadsheet.

While you can have only eight fonts in memory at once, you can change your fonts from a library of typefaces. Allways recognizes any fonts built into your particular printer and works with nearly all the Hewlett-Packard laser cartridges. ►

and style checker, a "readability" checker, an on-screen outliner, and a mimic mode that borrows familiar commands of many popular word processors. Also includes a dictionary, a thesaurus, and a modest macro processor, all in an easy-to-learn package. Has pull-down menus and context-sensitive help. Automatically backs up files and emphasizes data safety. Supports only a modest number of printers. Manual is somewhat skimpy. Requires 512K RAM, MS-DOS 2.0 or later, and one floppy drive. Not copy-protected. Timeworks Inc., 444 Lake Cook Road, Deerfield, IL 60015, 800-535-9497. (April 1989) Rating: **4.0**

SPRINT 1.0, $199.95. Word processor whose alternate interfaces mimic your other favorites by employing their menu and keyboard protocols; its own interface is excellent, featuring many pull-down menus. Autosave feature stores work to a special disk file when you stop typing for three seconds. Saves changes to as many as 24 files that can be open at once. Easily creates multiple columns, nested and numbered lists, index or table of contents headings, and footnotes. Supports ample printers, including lasers, and has a spelling checker and thesaurus. Awkward for mail merging and default changing. Does not merge graphics or import Lotus 1-2-3 spreadsheets, and lacks such desktop publishing features as WYSIWYG. Requires 256K RAM and MS-DOS 2.0 or later. Not copy-protected. Borland International Inc., 1800 Green Hills Road, Scotts Valley, CA 95066, 408-438-8400. (January 1989) Rating: **4**

WORD PERFECT 5.0, $495. Popular word processor now features integrated graphics. Imports pictures, charts, or graphs and can resize, rotate, and even photographically reverse them. New page-preview feature displays document as it will look when printed. Stores graphics in document files. Positions cursor by measuring in inches, centimeters, or printer's points and picas. Over 100 specialized printer drivers. Includes macro programming language. New "styles" feature lets you define and store combinations of formatting codes and select them from a menu. Good documentation. Can't import Microsoft Word files. Requires 384K RAM, MS-DOS 2.0 or later, and two disk drives (hard drive recommended). Graphics adapter required for editing graphics and page preview. Not copy-protected. Word Perfect Corp., 1555 N. Technology Way, Orem, UT 84057, 801-225-5000. (December 1988) Rating: **4**

WORDSTAR PROFESSIONAL RELEASE 5.0, $495 (upgrade $119 plus $9 shipping and handling). Fast, comprehensive word processor now boasts easy-to-use footnotes and endnotes, support for fancy laser fonts, and impressive page preview. New pull-down menus soften cryptic commands. Page-layout and printing options now appear in handy dialog boxes. Advanced Page Preview feature lets Hercules, CGA, EGA, or VGA show a view of your printed document, complete with fonts and columns, in any size. Has built-in calculator. Imports Lotus or Quattro files. Windows feature lets you work on two documents at once. Can not import graphics. Requires 384K RAM (512K for page preview), MS-DOS 2.0 or later, and two floppy drives. Not copy-protected. Micropro International Corp., P.O. Box 7079, San Rafael, CA 94901, 800-227-5609. (February 1989) Rating: **4**

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GR#32E/R - WORDPERFECT 5.0 ART SET #3 - 4 DISKS Assortment of 370 images in PCC format
GR#34A - CLIPART - MEN 5 DISKS Men at business, leisure, sports in 300DPI with PCX format for Ventura, WordPerfect, 1st Publisher
GR#34B - CLIPART - WOMEN 3 DISKS - Women at business, leisure, sports in 300DPI with PCX format for Ventura, WordPerfect, 1st Publisher
GR#34C - CLIPART - EDUCATION 3 DISKS - Schools, students, graduates, etc digitized at 300DPI in PCX format for Ventura, Word Perfect 1st Publisher
GR#34D - CLIPART - OLD FASHIONED #1 3 DISKS - Turn of the century images digitized at 300DPI in PCX format for Ventura, WordPerfect, 1st Publisher
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(You'll need to slip out to the Print menu to find the list of available HP cartridges.)

One drawback to the program is that Allways doesn't recognize soft fonts other than those provided with the program. And although Allways works with the Apple Laser Writer, Laser Writer Plus, and Postscript printers, it supports only the fonts built into those machines. However, most people will still find the font capabilities of Allways are more than adequate, even impressive.

Graphing Advantage

The graphics power of Allways is spectacular. With it, for the first time in Lotus, you can insert a graph right beside a column of numbers, or you can integrate them, generally, throughout a report. You can include up to twenty 1-2-3 graphs in your spreadsheet, and place them anywhere you want them. While Allways does not make available its own fonts for graphs, you can adjust the size of your graphs just by manipulating the columns and rows in which they appear. Simply follow the menus.

When you get ready to print out your work, you can add headers and footers to your pages and establish page breaks wherever you want them. Although you can print in landscape size with Allways, you can't print your spreadsheets continuously sideways.

With extra font support, a Postscript interface, and full control of your graphs and charts, Allways provides 1-2-3 users with more presentation-quality printing options than does Microsoft Excel.

Lotus has recently purchased the rights to Allways, and the program will be included free with 2.01 and all future versions of 1-2-3 and Symphony. For those who already own Lotus 1-2-3 Release 2.01, Allways is available either from Funk or from dealers.

Ease of use	**4.0**
Performance	**4.0**
Manuals	**3.0**
Value	**4.0**
Overall Rating	**3.8**

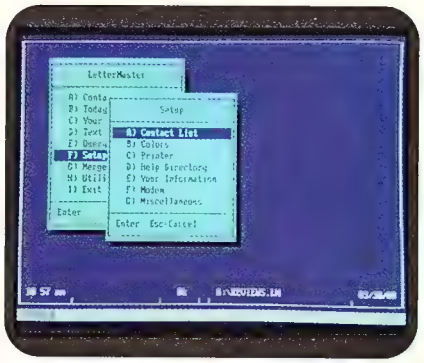
—Marvin Bryan

Requires Lotus 1-2-3 Release 2.0 or 2.01, 100K RAM beyond the 256K minimum needed by 1-2-3, MS-DOS 2.0 or later, a hard drive, and a dot-matrix or laser printer (graphics card recommended). Not copy-protected. Funk Software Inc., 222 Third St., Cambridge, MA 02142, 617-497-6339, $149.95 (free from Lotus Development Corp. with purchase of 1-2-3).

Letter Master 4.0

Keeping in touch made easier.

REMEMBER WHEN small-business database programs just sat there displaying names and addresses? Letter Master, a dedicated client and mailing list manager, follows through with much more practical office assistance. For example, it uses



Letter Master 4.0 gives you two databases in one package.

your records to preaddress letters, print mailing labels, dial phone numbers, or merge selected names and addresses with an individualized salutation into a form letter. A Follow-up option can remind you who to recontact on any given day.

Not a Word Processor

Letter Master's forte is pulling together the elements of business correspondence quickly (addresses, salutations, boilerplate paragraphs), but its weak editor is nothing to write home about. While it has no block operations (move and erase) and limited formatting, it will accept ASCII documents imported from your full-grown word processor. Actually, the name of this program is misleading. It's much more versatile as a client or member database than as a writing tool. Letter Master is no word processor.

Letter Master is actually two databases in one package. One is a prestructured name and address contact list, and one is a free-form subject-oriented note file.

For example, if you were a real estate agent, one database would act as your potential-buyers list, and the other might act as your properties file, which you can

search by subject, keyword, or category—that is, "Farms" (subject); "Old," "Restored," "Estate" (keywords); and "For Sale," "Rental" (category). Moving between the two is a snap: Find a house, then find a customer.

Each record has all the expected information fields predefined (such as name, address, and phone), plus keywords and contact dates (first, last, and next). Only four fields are user-defined, and one must be a date (like "birthday"), but the other three can be up to 50 characters long.

You can further personalize each record on an attached free-form update note, with, for instance, the house hunter's personal preferences, financial considerations, or questions to be answered.

Letter Master flags new or changed records until you reset the contact list, and you can scan for duplicates. The software imposes no limit on the number of records, and it will automatically find and use extended RAM. Memories smaller than 540K may have to dump resident utilities to give the database room to breathe.

Selecting records for screen display or a report is particularly easy in Letter Master. Predefined blank report formats include a helpful variety of summaries, address and phone books, and Rolodex-like cards. Or you can define your own columns.

Letter Master can merge records from or to any Dbase III–compatible file, five major word processors, plus ASCII and even a mainframe.

The adequate on-line help is itself a 174-record database. I call it "approximately context-sensitive" because it doesn't have unique help screens for every menu choice, but it's always relevant. A demo disk and 30 days of free phone support are also available.

Compatible with most major LANs, Letter Master allows network log-in names and displays multiple user activity and history. It can also lock files for maintenance. In your real estate office, it would inform all other agents on the system that a certain client is your current prospect.

Some Handling Problems

Letter Master prints mailing labels only one across, a slow process for those with wide carriage printers, and you can't recover from a mistake in some reporting or printing operations without rebooting the computer. The program also evaporates from memory when your printer runs out ►

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of paper. Research and development should also consider a macro feature that would make record building easier.

A new version, which should be available by the time you read this, promises to handle at least the label-printing problem.

On the whole, this dedicated database is a lot of program for the price. Its friendly face and compatibility with other databases and word processors make it an excellent choice for any list-dependent business or organization. Completely menu-driven, with no commands to remember, Letter Master may be the reliable, small business tool you've been looking for.

Ease of use	**4.0**
Performance	**4.0**
Manuals	**3.0**
Value	**4.5**
Overall Rating	**3.9**

—LONNY J. BROWN

Requires 512K RAM and DOS 2.1 or later (640K RAM and MS-DOS 3.1 or later for network version), and two floppy drives (hard drive strongly recommended). Not copy-protected. Dilg Publishing Corp., P.O. Box 110216, Arlington, TX 76007, 800-338-9181, $189 (network version $495).

Logic Gem

Unweaving tangled webs.

LOGIC, A DISCIPLINE formulated by the ancient Greeks and used by mathematicians for years, remains one of programming's trickier facets. Yet the principles of logic control many options within any computer program. A Basic language "If. . .then" statement is a good example of logic at work: "If a number is less than average, then print an asterisk." In a large program, these logical relationships can become very cumbersome. Conditions ("ifs") are not always a simple true or false, and actions ("thens") are not always singular events.

Logic Gem includes an editor, an interpreter, and a compiler.

Logic Gem from Sterling Castle helps you build logic tables to assist in the design of program logic. The program not only automates the creation of the relationships between conditions and actions in your program, but it also spots errors and omissions in your logic. Finally, Logic Gem generates code in Basic, C, Fortran, Pascal, or even Dbase, which you can add to your programs.

THE COMPONENTS OF LOGIC GEM

Logic Gem is a logic processor. The program includes an editor, an interpreter, and a compiler. First, you start in the program's editor by creating a table of conditions and actions. At the top of the table, you enter a condition; usually it follows the form: "If condition X is true. . ." You then follow the condition with an appropriate action. For example, for the condition "If it's raining," a suitable action might be, "wear a raincoat." Together, a condition and its accompanying action become a rule.

Most people start to lose track of the relationships among ideas when their number exceeds six or seven. Not so with Logic Gem: It can manage up to 99 distinct rules. The conditions of these rules don't have to be simple true/false or yes/no situations; you can, for example, assign a number from one to 10 to specify up to 10 levels of probability for any given condition.

Logic Gem also combines related conditions and actions, making them into complex rules. For example, a complex Heart trick might be: "If the six of diamonds is led, and if the ace of hearts is played, and if the queen of spades is played, then play a diamond lower than six."

After you've entered a number of conditions and actions into a table, Logic Gem can take over much of the task of fleshing it out. That is, you needn't know the relationship between every condition and action. From those that are listed, Logic Gem can figure out the relationships among many other conditions and actions. The larger the table you are constructing, however, the more guidance you'll have to give Logic Gem.

If Logic Gem relates two conditions in

a way that you didn't intend, you can always edit the table to set up the correct relationship.

You can test the accuracy of your logic table using Logic Gem's interpreter, which lets you test your conditions to see if the appropriate action results from the series of conditions you have set up.

The problem of missing logic is a serious one in computer programming. To exhaustively test a large program could take years because of the number of possible keystrokes and events that might occur during a program's run. Logic tables can help programmers eliminate bugs caused by this missing logic.

In its final steps, Logic Gem's compiler produces an English description of your logic—this is, more or less, a listing of all your program's relationships—and it's complete enough to be used as Remark statements for documenting your program. Finally, Logic Gem generates program code that lets you accomplish a logic task in Basic, C, Fortran, Pascal, or Dbase. You can save this code in a file and include it in any program.

At one level, then, Logic Gem is a programmer's tool—a way for programmers to write and test complex logical interactions. But the program can do even more. The lofty aims of Logic Gem include its use as a programming tool to help build an "expert" system, a computer program that tells the less experienced how to solve a problem or how to make the right decision given certain market or environmental facts—when to approve a loan, when to sell your business, when to use concrete as a building material, and so forth. To develop an expert system, an experienced professional tries to relate what he or she knows of science, law, engineering, or some other discipline by means of the same kind of rules that programmers use. These rules match a condition with an action. For example, "If it is below 32 degrees Fahrenheit, then water will freeze."

These professionals need not be programmers, according to the program's manufacturers. Experts can now sit down with Logic Gem and define the complex rules they use to solve problems in their discipline. By putting the rules for any logical system (whether it is a program or an expert system) into a table, you can uncover any rules that may have been omitted. Logic Gem will find the important ►

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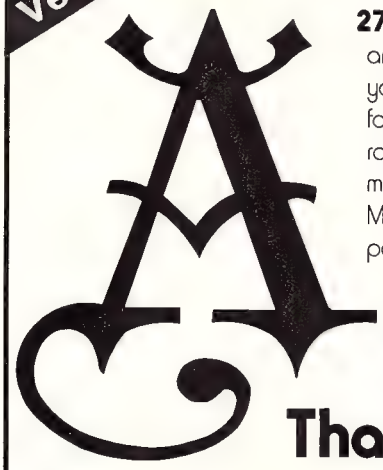

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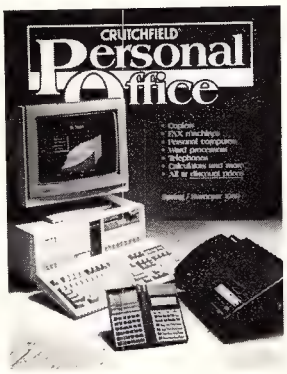

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missing step, test the logic, and show you where you need to make changes to handle the missing step.

Impressions

But, you may ask, how easy is Logic Gem to use, especially for the non-programmer? I spent several hours creating logic tables before I caught on to the intricacies of using Logic Gem. While the logic table editor is easy to use, my internal logic generator didn't work well until I had built several useless logic tables. After a while, however, using Logic Gem actually prompted me to think more logically about my programming problems.

Logic Gem's 150-page manual contains some hard-sell text about the advantages of logic tables, and while I was put off by this arm-twisting at first, it did help me understand the usefulness of the technique. The manual explains Logic Gem well, and the writing is better than in most technical manuals I've seen.

While Logic Gem has set itself some high goals, happily for us it turns out to be surprisingly useful in some less glamorous, albeit important, logic processing tasks such as writing most any computer program.

Logic Gem may initially appeal to a relatively small group of users, but its ultimate uses are difficult to predict. The question is, will it bring expert systems to within reach of non-programmers? Even Star Trek's eminently logical Mr. Spock probably couldn't answer that.

Ease of use	**4.0**
Performance	**3.5**
Manuals	**4.5**
Value	**3.5**
Overall Rating	**3.9**

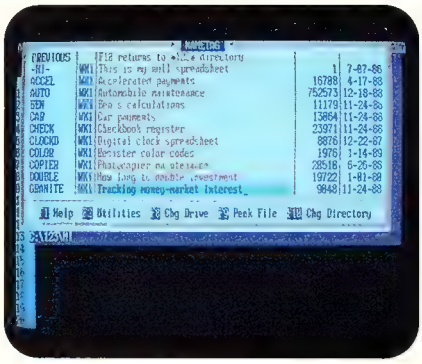
—G. Michael Vose

Requires 150K RAM, MS-DOS 2.0 or later, and one floppy drive (hard drive strongly recommended). Not copy-protected. Comes with both 5¼- and 3½-inch disks and a 90-day money-back guarantee. Sterling Castle Software, 702 Washington St., Suite 174, Marina del Rey, CA 90292, 213-306-3020, $198.

Name Tag

What's my file?

DO YOU WORK with spreadsheet files often, always revising and updating them? Is your financial subdirectory filled with entries like APRIL1.WKS, APRIL2.WKS, APRILRVS.WKS? If so, Name Tag—a little RAM-resident utility—can help



Name Tag can help you identify and organize your files, and it's easy to use.

you identify vaguely named files on any disk.

By calling up Name Tag's user-friendly window, you can examine your disk directories sorted by names, sizes, and the creation dates of every file on every disk. Furthermore, you can enter and store a description, up to 40 characters, of every file and directory.

As if that weren't enough, Name Tag also lets you peek at the contents of ASCII (text) files or batch files. And from within any application, Name Tag can pop up to copy, delete, and rename disk files. Name Tag stores your comments in separate, easy-to-erase disk files, and it pops up safely over many applications, including 1-2-3 and Desqview.

Name Tag is one of those rare utilities that's easy to install, easy to operate, and doesn't cost much either in memory or in dollars.

It is a program with few flaws, but I would have liked to see a way to unload it from memory if I needed extra RAM space. Also, Name Tag does not offer you any way to change the hot key, nor is there a way to use expanded memory. Also, there is no way to run it as a conventional standalone program—a non-terminate-and-stay-resident utility. One other thing: I wish that Name Tag could search through a whole disk's file descriptions for key words, such as "Letter about Billing Mistake," to help me locate files quickly. Perhaps in the next version.

Name Tag is a valuable worker around the office. It comes with an easy-to-understand manual, and while it's rivaled by some other utilities—such as File Info,

included in The Norton Utilities—it's half the price. I can recommend the program.

Ease of use	**4.5**
Performance	**3.5**
Manuals	**3.5**
Value	**4.5**
Overall Rating	**4.0**

—ALAN L. ZEICHICK

Requires 58K RAM, MS-DOS 3.2 (with 3½-inch disks) or later. Hard drive recommended. Not copy-protected. Mastersoft, 4621 N. 16th St., Phoenix, AZ 85016, 602-277-0900, $39.95.

No-Squint Laptop Cursor

Look! It's your cursor!

IT MAY SOUND like a high-tech ransom demand—"You wanna see your cursor again? Put 40 bucks on the counter of your local software store." But the idea behind Ken Skier's No-Squint Laptop Cursor will appeal to any portable-computer owner with a headache. If you're tired of scouring that LCD screen trying to find that dimly lit underline that gets itself lost among your characters, here's a utility that changes the cursor to a big, flashing block.

The price is steep, but No-Squint lives up to its name. It requires less than 2K of RAM, and it lets you specify how quickly the cursor flashes: any of nine speeds, from molasses to frenzied. The more vivid and visible cursor puts an end to searching through 25 lines by 80 columns of text trying to find that skinny line. (Before, I had to hit the Home key every so often and take my bearings from the top-left corner of the screen.) No-Squint helps you use your laptop without losing your place—or your patience.

No-Squint has one limitation: It can't help you if you're running graphics software. But the program clarified all the character-based programs I tried with it, and No-Squint had no trouble with other memory-resident utilities such as Sidekick and Battery Watch.

Once you try it, you'll take No-Squint for granted. And you'll miss it when you go back to your old cursor.

No-Squint's no bargain, but it'll find a place in the hearts and AUTOEXEC.BAT files of laptop owners everywhere.

Ease of use	**4.5**
Performance	**4.0**
Manuals	**3.0**
Value	**1.5**
Overall Rating	**3.3**

—ERIC GREVSTAD

Requires 2K RAM, MS-DOS 2.0 or later, and one 3½-inch floppy drive (5¼-inch disks available upon request). Not copy-protected. Ski Soft Publishing Corp., Suite 79, 1644 Massachusetts Ave., Lexington, MA 02173, 617-863-1876, $39.95 plus $2.50 shipping and handling. ◆

THE BBS

PC Resource*'s new BBS and additional phone lines are in operation. We are working to make the system as easy to use as possible. We ask your patience during this period of transition, and welcome your suggestions.*

PC RESOURCE OPERATES a special BBS (603-924-9337) as a service to its readers. Access to the board is free, so the only expenses you incur are phone costs. Users can leave messages for the *PC Resource* staff, download programs, or shoot the breeze with fellow readers. The BBS's features include electronic mail, a BBS information center, and special-interest groups (SIGs) that provide major program listings published in *PC Resource* since its first issue in April 1987, shareware programs, and a user forum.

Users can log onto the system 24 hours a day, seven days a week, but daily access time is limited to 60 minutes. The BBS's protocol settings are 2,400, 1,200, or 300 bits per second (bps), 8-bit words, no parity bit, and one stop bit (2,400/1,200/300,8,N,1).

To download a program, select option S from the main menu. Then select option S? to see a list of SIGs. To choose a SIG, type a slash and the name of the SIG (/Jan89, for example). At the next menu, press D to download a file. At this point, you can type L to get a list of all the files in the SIG or type S to scan through the SIG's files. A program description is attached to each file. Read the message, and if the program interests you, type Y in response to the download prompt. You must then choose a file-transfer protocol (ASCII text, Xmodem, Xmodem-CRC, or Ymodem-CRC). Finally, press the key or key combination your communications software requires to begin downloading files.

To save disk space and reduce file-transfer time, the *PC Resource* BBS stores and transfers most files in compressed format. If you're new to telecommunicating, you should download ARC532.EXE from the /Programs SIG. This file contains the shareware archive utility programs you need to unpack the files you download. You might also download files PROCOMM1.ARC and PROCOMM2.ARC from the /Programs SIG to get a good shareware telecommunications program.

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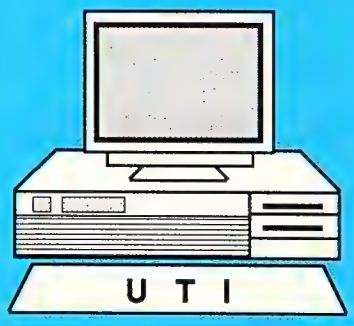

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NEW PRODUCTS

A look at the latest in the MS-DOS marketplace.

PC COMPATIBLES

Gold Star Technology, known mainly for its monitor and modem products, has released several desktop computers. On the low end is the **GS100**, a 10MHz, 8088-based computer with 640K RAM and four expansion slots. The **GS200 DESKTOP AT** is a 10MHz, 80286 machine with 640K RAM and three expansion slots. For more speed and memory, there's the **GS230**, a 16MHz, 80286-based computer that comes with 1MB RAM and five expansion slots. Standard features for all three include one 5¼-inch floppy drive, one serial port, and one parallel port. Suggested retail prices are $945 for the GS100, $1,295 for the GS200, and $2,195 for the GS230.

Contact Gold Star Technology Inc., 1130 E. Arques Ave., Sunnyvale, CA 94086, 408-737-8575.

CIRCLE 101 ON READER SERVICE CARD.

The **ME 386-33** by Micro Express is the company's latest addition to its line of desktop machines and one of the first computers to incorporate Intel's new 33MHz 80386 chip. It comes with 4MB RAM (expandable to 8MB) with 64K cache RAM. You can order either a 5¼- or a 3½-inch floppy drive. The computer's standard configuration includes one parallel and two serial ports and eight expansion slots. Suggested retail price is $5,995.

Contact Micro Express, 2114 S. Grand Ave., Santa Ana, CA 92705, 800-642-7621 or 714-662-1973.

CIRCLE 102 ON READER SERVICE CARD.

Another computer line to take advantage of the new Intel chip is the **AST PREMIUM 386/33**. The computer comes standard with a 5¼-inch floppy drive, 2MB RAM (expandable to 4MB), one parallel and two serial ports, and seven expansion slots. In addition, you get several bundled utilities, such as ASTEMM, an EMS 4.0-compatible

PRODUCT HIGHLIGHTS

What do you get when you bundle an assortment of interesting hardware and software into a low-priced computer? In the case of Altima Systems and Atari, you get what promises to be a good value.

Altima Systems' first entry into the computer market, the ALTIMA ONE, is a 286-based portable with desktop power. Standard features include a built-in 2,400-bps modem, as well as an optomechanical mouse. As part of its introductory offer, Altima Systems is including Borland International's Sidekick Plus with its portable, along with a carrying case and Fuji high-density disks. The Altima One does not sacrifice power for portability: Running at 8–16MHz, the machine has 1MB RAM (expandable to 5MB) and a 20MB hard drive with a 27-ms access time. It has a 3½-inch floppy drive. The display is CGA and MDA compatible and is comprised of a paper-white backlit LCD screen with 640-by-400-pixel resolution. Other features include a 101-key detachable keyboard, serial and parallel ports, and a half-card expansion slot. The Altima One weighs 15 pounds. Suggested retail price is $2,699. Contact Altima Systems Inc., 1390 Willow Pass Road, Concord, CA 94520, 415-356-5600.

Altima One by Altima Systems.

Atari Computer, known in the past for its video games, is venturing into the United States PC market after several years of focusing on Europe. One of Atari's first releases here is the PC 4, a low-priced computer with a 12MHz 80286 processor. The $1,995 AT has 1MB RAM (expandable to 8MB), a 1.2MB floppy drive, and a 60MB hard drive. The system is configured with six expansion slots; serial, mouse, and parallel ports; and a socket for an 80287 math coprocessor. Like Altima Systems, Atari has added even more value to its computer by bundling several software packages with it, ►

compiled by MARY ANN WILLIAMS

expanded memory manager utility for memory-intensive applications, and ASTCache, a disk-caching program that reduces hard disk access time. Suggested retail prices are $6,595 for the Model 5 and $8,595 for the Model 105, which comes with a 110MB hard drive.

Contact AST Research Inc., 2121 Alton Ave., Irvine, CA 92714, 714-863-1333.

CIRCLE 103 ON READER SERVICE CARD

PERIPHERALS

Mark Computer Products has released a modem that you can use with both laptops and desktops. The **MARK 2400X MODEM** is an external, 2,400-bps modem that provides synchronous and asynchronous communications. It features a pass-through serial port that lets you plug in a serial peripheral so that both it and the modem can operate at once. The modem measures 1½ by 4⅕ by 5½ inches. With its Velcro mounting kit, you can attach the modem to the side of your computer. Suggested retail price is $289.

Contact Mark Computer Products Corp., 470 Washington St., Norwood, MA 02062, 800-762-6275 (617-762-9100 in Massachusetts).

CIRCLE 104 ON READER SERVICE CARD.

A new entrant in the multiscan monitor market is the **SAMPO ALPHA SCAN**. The 14-inch, color, autosyncing monitor offers resolutions from 320-by-200 pixels up to 800-by-600 pixels and a .31-mm dot pitch. It displays 64 colors in TTL mode and unlimited colors in analog mode. It also includes a built-in, tilt-and-swivel base. The text switch lets users with CGA or EGA cards choose amber, green, or white text. Suggested retail price is $789.

Contact Sampo Corp. of America, 5550 Peachtree Industrial Blvd., Norcross, GA 30071, 404-449-6220.

CIRCLE 105 ON READER SERVICE CARD.

HARDWARE ADD-ONS

Logix Microcomputer introduced a high-speed, affordable VGA card. The **LOGIX VGA 1000 VIDEO CARD** has a 16-bit interface and features the Trident Graphics Chip. According to the company, the Logix VGA 1000 outperformed the Paradise VGA Plus 16 during tests on a 386 25MHz computer. The card offers a maximum resolution of 1,024 by 768 pixels, as well as a 50MHz ► including Microsoft Windows/286, Windows Paint, and Windows Write. Contact Atari Computer, 1196 Borregas Ave., Sunnyvale, CA 94086, 408-745-2000.

Superbase 4 Windows by Precision Inc.

Software developers seem to be embracing Windows with a passion. Not long ago the first Windows-based word processor—Palantir Software's Wintext—was announced; now, Precision Inc. is incorporating Windows in two new databases, SUPERBASE 2 WINDOWS and SUPERBASE 4 WINDOWS. The Superbase 2 Windows database, with its easy-to-learn interface, supports a number of fields, including multiple response, dates, and calculations. It can perform data validation and cross-lookups. Superbase 2 Windows also includes a built-in text editor, mail merge, and label printing. Photographs or painted images can be displayed as fields in the database. Superbase 4 builds on Superbase 2 by adding a programming language and a forms designer. The language is a superset of Basic that incorporates more than 250 database commands and functions. The Superbase Forms Editor offers object-oriented forms design. Boxes, shaded areas, lines, scanned images, and text can be positioned anywhere on a page. Forms can be set up to perform relational links. Both Superbase databases include a runtime version of Windows/286. Suggested retail prices are $295 for Superbase 2 Windows and $695 for Superbase 4 Windows. Contact Precision Inc., 8404 Sterling St., Irving, TX 75063, 214-929-4888.

Speaking of Windows-based word processors, Samna Corp.'s entry in that category, Ami, will soon have a sophisticated companion: AMI PROFESSIONAL. Professional offers more advanced word processing features for the power user without sacrificing the original Ami's friendly user interface and file structure. The combination desktop publishing and word processing program, which is ideal for preparing presentation-quality business documents, comes with a thesaurus, macro capabilities, a built-in drawing program, and mail merge. A new feature called Tables formats tabular information, which you can import from spreadsheets. Ami Professional can create footnotes and endnotes as well as a table of contents, and it lets you work on two documents at once. Ami Professional also supports dynamic data exchange, which lets you link up with other Windows applications. Suggested retail price is $495; a runtime version of Microsoft Windows is included. Contact Samna Corp., 5600 Glenridge Drive, Atlanta, GA 30342, 800-831-9679.

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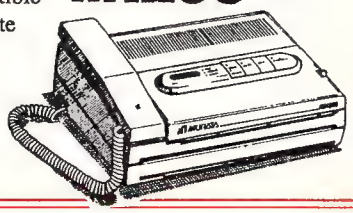

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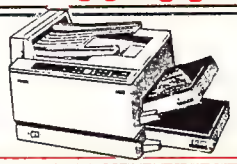

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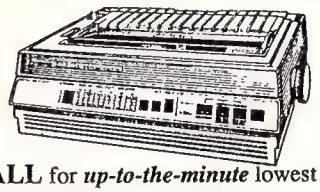

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clock rate. It comes with drivers for Lotus, Gem, Windows, Word Perfect, and others. Its 256K video RAM is expandable to 512K. Suggested retail price is $269.

Contact Logix Microcomputer Inc., 12 Oaks Business Park, 375 Morgan Lane, West Haven, CT 06516, 800-248-2140.

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Contact Lifetree Software Inc., 411 Pacific St., Monterey, CA 93940, 800-543-3873 (800-831-8733 in California).

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MACE BACKUP, a disk backup system for your hard disk, is now available as a stand-alone program. Formerly included with Mace Gold, Mace Backup backs up files at speeds up to 2.5MB per minute, according to its makers. The program creates a backup summary file so that you can quickly locate which files you want to restore. You can back up selected files by indicating their names, extensions, directories, or dates. Files can be restored to different drives or directories. The program's Power-Out Protector saves memory at regular intervals. Suggested retail price is $99.

Contact Paul Mace Software, 400 Williamson Way, Ashland, OR 97520, 800-523-0258.

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HYPER NOTES is a text-based database for those who shun traditional data-entry structure; it works with your random notes, organizing them according to your own criteria into "Groups." Each note can be placed into as many groups as you want. Hyper Notes creates reports and displays and moves data from one note to another. Each note is dated as it is entered and when it is revised. The program can scan your notes for occurrences of words or phrases. Suggested retail price is $360.

Contact Sauer Computer Systems, 1750 S. Brentwood Blvd., St. Louis, MO 63144, 800-234-2100.

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IF YOU HAVE *a product you'd like to announce, send a description of its features, specifications, suggested retail price, and a color photo to Mary Ann Williams,* PC Resource, *80 Elm St., Peterborough, NH 03458. All information about price, performance, and availability of products listed in this section is based on manufacturers' reports.* PC Resource *provides numbers after each entry to assist our readers in finding more information about new products. Circle the corresponding number found on the Reader Service Card at the rear of the magazine.*

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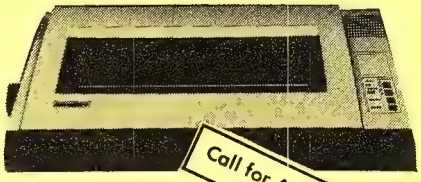

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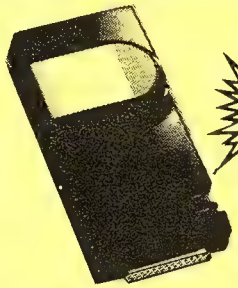

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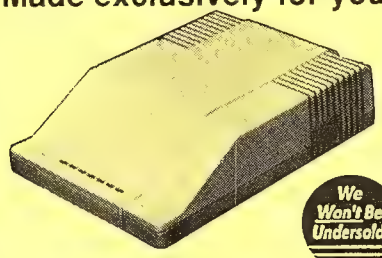

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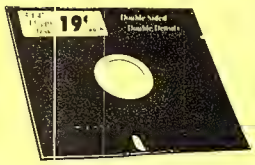

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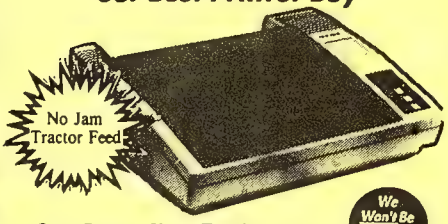

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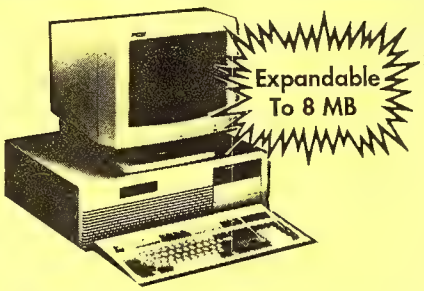

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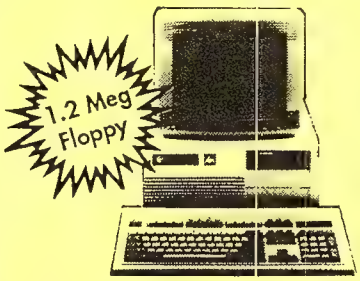

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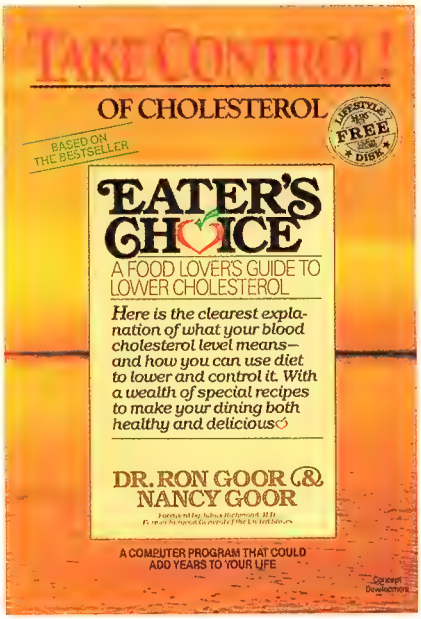
WORRYING ABOUT CHOLESTEROL has replaced exercise as the number one health fad. So it isn't surprising that computer programs to help you manage your cholesterol intake have begun to appear.

Take Control! of Cholesterol from Concept Development Associates is an inexpensive product that adequately assists you in tracking the fat and cholesterol content of the foods you eat. Actually, it focuses on the saturated fat content, a more common type of fat that often coexists with cholesterol and is equally responsible for increasing your risk of heart attack and stroke. Take Control! is based on *Eater's Choice* by Dr. Ron and Nancy Goor, one of the best of the recent cholesterol books—so closely based, in fact, that the on-line manual consists mostly of unedited excerpts from the book. A hypothetical dieter named George pops up suddenly with no antecedent reference to who he is or why he's being mentioned; the introductory paragraph from the book was cut. The haphazard nature of the manual lends a disconcerting, shareware feel to the program.



Getting data into Take Control! is easy enough to figure out, but the numerous menus make the process cumbersome. You start out by creating a personal profile containing your age, height, frame size, and activity level, and the program responds with a recommended daily intake of total calories and saturated fat (sat-fat) calories. Then you lumber through a daily meal plan, laboriously flipping through a less-than-comprehensive food list in search of something close to what you have eaten or plan to eat.

The program keeps a running tab of regular and sat-fat calories as you enter foods. If you go over the daily limit, you can go back to the food list and look for foods with fewer calories. You can carry over unused calories into the next day, with the ultimate goal of staying within a weekly limit. Flexibility is the best thing about the Goors' system: It lets you keep sane by occasionally indulging in fatty foods if you compensate by eating less at other times. I question the use of calories instead of grams as the unit of fat measurement, however. Although calories are easier to understand, most cholesterol books measure fat content by grams.

Take Control! of Cholesterol ($39.95) is not nearly as elegant as Nutridata Software Corp.'s $79.95 Diet Balancer (Timeout, May 1989, page 151), which is also marketed by the Lifestyle Software Group. Take Control!'s food database is incomplete, and the command interface is awkward while the Diet Balancer's is smooth. Still, its low price makes it worth considering as a first step into computerized diet management. The non-copy-protected program requires 512K RAM, MS-DOS 2.1 or later, and one floppy drive. You must specify whether you want a 5¼- or a 3½-inch disk. Contact Lifestyle Software Group, St. Augustine, Fla., 800-289-1157.

—DAVID ESSEX

Jack Nicklaus' Greatest 18 Holes of Championship Golf

The sun, sand, and turf you've always dreamed of.

HOW DOES IT feel to go one-on-one with the greatest pro golfer of all time? Unless you've been hit by a gravel truck lately, the feeling may be hard to describe.

Accolade's Greatest 18 Holes of Championship Golf doesn't give you a private audience with the "Golden Bear" himself, but the realism of this electronic golf simulation can be uncanny. I sometimes find myself obliged to mutter, "You're up, Jack," after which he describes the layout of the next hole, shares a secret golfing tip, and then proceeds to beat me soundly.

Aside from its great graphics and technical wizardry, Greatest 18 Holes of Championship Golf would be like many other commercial golf simulators, if it weren't for its unique plot and realistic scenery. Jack

Nicklaus describes 18 of his most memorable golf holes, which the folks at Accolade have turned into an electronic "super ►

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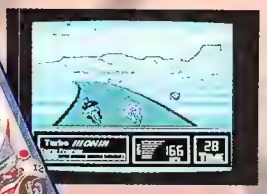
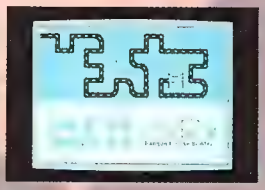
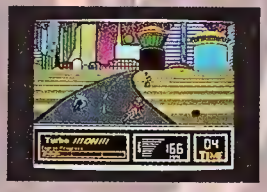
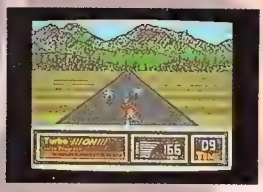
FULL TILT.
PRO CYCLE ACTION.









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Circle 408 on Reader Service card.

course." Each hole is accurately detailed down to the last tree, sand trap, and bunker. The result is a feeling that you're actually playing right there on the world's greatest golf courses: Pebble Beach, St. Andrews, Riviera CC, Royal Lytham, Balustrol, Merion, Muirfield, Oakmont, and the stately old Augusta National Club.

The game play can be easy going or as rough-and-tumble as you like. You pick both the level of play and your opponent. As a beginner, your drives fly straight and true, and the computer selects the proper club for each shot and gives you an even break on the greens. At the pro level, you drive from the back tees and contend with head winds, cross winds, tail winds, undulating greens, and relentless opponents who "go for the stick" with each shot.

Besides Jack Nicklaus, there are eight other computer opponents with various skills and individual golfing habits. Lars X is a long hitter, fashions himself an expert, but often hooks the ball into the woods (snicker!). Nancy D swings a wimpy putter but shows occasional streaks of fairway brilliance. Curly O is a true duffer who flails away in sand traps, takes too long to decide on each shot, and realistically tries your golfing patience. My favorite opponent is Eddie C, an incorrigible sand bagger who shoots a scratch game. This guy makes a tough opponent any day of the week.

There are two ways to play. "Championship Skins" pits you head-to-head with your opponent for a big dollar prize (up to $10,000,000) like the real "Skins Game" the pros play on Saturday afternoon TV. If you prefer a more placid game, you can set out on a traditional "Stroke Play" match with up to three real or computer opponents.

Other features include a practice green, driving range, on-line help, an electronic scorecard with detailed tee-to-green statistics, and an optional overhead view of the hole that helps you plan your golfing strategy. There is no pro shop or bar.

Besides the "Greatest 18 Holes" course, there are two other demanding layouts on the course disk, both coincidentally designed by Jack Nicklaus—a replica of the rocky Castle Pines Golf Club in Castle Rock, Colo., and the monster Golf Club at Desert Mountain (Cochise) in Scottsdale, Ariz.

In May, Accolade introduced an accessory disk for the program, "The Major Championship Courses of 1989." It allows you to play the same courses the touring pros will face in the "majors" this year: the Oak Hill CC, Rochester, N.Y. (U.S. Open); the Royal Troon Golf Club, Troon, Scotland (British Open); and the waterlogged and tough Kemper Lakes Golf Club, Hawthorn Woods, Ill., where the PGA will host this year's international field of champions.

I found Jack Nicklaus' Greatest 18 Holes of Championship Golf entertaining and irresistable. Along the way, I may have even picked up a few pointers from the master. Only summer will tell.

Jack Nicklaus' Greatest 18 Holes of Championship Golf is available from Accolade Inc., San Jose, Calif., 408-296-8400. It sells for $39.95 and requires 384K RAM, MS-DOS 2.1 or later, one floppy drive, an IBM PC/AT or Tandy 1000, and a CGA, EGA, Hercules, or Tandy graphics adapter. Off-disk copy protection. Optional "Major Championship Courses of 1989" disk available for $19.95.

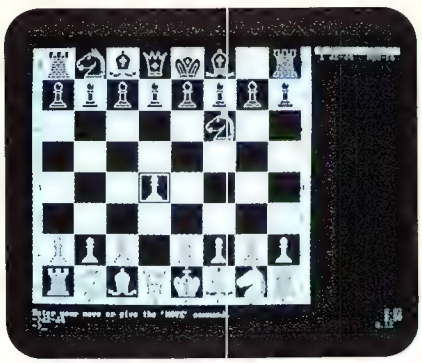
—JOHN WOLFSKILL

Chess

Patient aggression with an escape.

IN 1972, THE official world chess championship was won by an American for the first time. If his name's not on the tip of your tongue, I'll tell you in a minute. In the 1500s, chess moves began to resemble their present form, but the game originated in India even earlier than this—any guesses? Well, it was Bobby Fischer. And it was 600 A.D. or before (historians disagree).

Of course, you don't need to know



those facts to play chess, but you *do* need to know how to play chess before you can play Chess—the computerized version by Scandinavian PC Systems Inc. After establishing some basic settings on the menu, playing through a match is pretty straightforward. However, the program includes many added attractions that make it quite exciting, entertaining, and educational.

How many chess-playing friends do you have who would change sides during a game or start all over from the beginning if *you* were the one who was losing? With Chess, you can easily choose one of those options and the computer never complains. In fact, once when I saw no hope remaining for my side late in a game, I switched sides (ha!). Then I watched the computer bring that losing side right back to power until it had me stalemated. It was incredible and fascinating.

The menu has six settings. The Mode of play allows you to set the skill level. The Side allows you to choose the color you want to be. The Beep sounds each time a move is made unless you change the menu setting to *Off*. The Display level allows you to decide how much information you want to see about the actual moves and the moves being considered by the program. The Automatic reply lets you choose whether the program takes its turn automatically or only when you tell it to (in which case you can also move its piece). And finally, the Screen type must be set according to your type of graphics adapter.

Other helpful options let you take a break, save your game, and restore it when you're ready to play again; solve problems by positioning the pieces anywhere you like; have the computer make one or more of your moves; or observe the computer play against itself. The program also performs special moves—castling, en passant, and queening a pawn. It scores each move according to the value assigned to each piece and its position on the board in relation to other pieces. A running record of each move is listed on the right-hand side of the screen in chess notation. And yes, there *is* a BIC (boss is coming) key.

If you like chess, you'll love Chess. It requires 256K RAM, MS-DOS 2.0 or later, one floppy drive, and either a color or monochrome monitor. (It can be used without a graphics card, but the playing pieces and moves would be shown as letters and numbers.) The program sells for $34.95. Not copy-protected. Contact Scandinavian PC Systems Inc., Rockville, Md., 800-288-7226.

—ELLEN SHAMONSKY BINGHAM ◆

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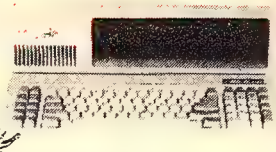

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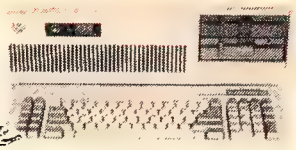

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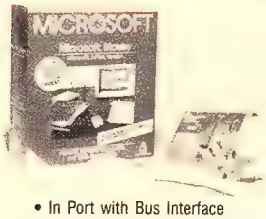

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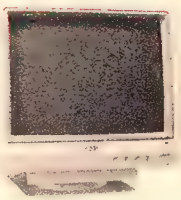

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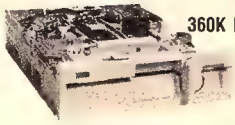

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Opus Brain Tease	GA 130	Trivia oriented fun for 1-4 players, 25 exciting and enlightening categories
EGA Slide Demo	GA 131	Show off that EGA with this attractive demo package!
Diamond Master Baseball	GA 132	A very in-depth and statistical approach to baseball for experts
Trucker	GA 133	Drive an 18-wheeler from Los Angeles to New York—absorbing
IBM HQ Infiltration	GA 134	Exciting text adventure you're a government agent in this one!
Adventure Addiction	GA 135	No less than 5 great text adventures!
Adventureware	GA 136	Yet another 5 adventures!
Cunning Football EGA	GA 137	New version 2.3! A dynamic game with excellent graphics —EGA needed for this one
Adventure Toolkit	GA 138	(2 disks) Create and play your own text adventure games great fun
PC-Pro Golf	GA 139	(2 disks) A must for the golfing fraternity good graphics
EGA Trek	GA 140	Superb Star Trek game for EGA fight the Klingons and Romulans great graf.x
Evels—the Adventure	GA 141	100 monsters 150 items DND style game in great shape!
Maze	GA 142	Wolfgang Stiller's incredible mind boggler get this one if you like a LENGTHY mental challenge!
Beyond the Titanic	GA 143	First class adventure from Apogee Software riveting!
Trek Trivia/Kingdom of Kroz	GA 144	Two more excellent Apogee offerings for Start Trek and adventure fanatics
Supernova	GA 145	Apogee again—an interactive text adventure of the most advanced genus—even "knows" adverbs!
PC-Jigsaw 1.10	GA 146	A really first rate jigsaw puzzle simulation from Bell Dedes—hours of intriguing and exasperating fun!
Solitaire	GA 147	A collection of absorbing card games for one player—nice CGA/EGA graphics and diverting!
Moraff's Revenge 3.2	GA 148	Beginner's version of this fantasy role-playing adventure in color with graf.x—well laid out
Uno	GA 149	Fascinating solitaire card game, with bonus games menu program!
EGA Sorry!	GA 150	Immensely popular version 2.0 of this classic game, for EGA card only
Words*Words	GA 151	A real head-banger of a word game for the loquacious—not for children though!
Gamescape	GA 152	The incredible adventure game designing system that lets you write and distribute your own games!
Ringwielder	GA 153	A full non-computer role-playing game (a book) in disk form, set in the worlds of fantasy and fiction
Marooned Again	GA 154	A logical adventure game—find the components to repair your crashed space ship—new version!
Giant Space Slug	GA 155	Worms at supersonic speed—roam the galaxy for food—new version!
Pinball Art Games	GA 156	Good pinball action—circus, money maze, par 3 golf, spooky and runway—NEAT!
Love Fire	GA 157	You fashion the structure of this love adventure as you go! Includes Red Planet & Castle Drogariya

Special Novice Starter Packs!

Pack PK 101 (10 disks)	
EZX-Spreadsheet	SP 102
3-D Chess	GA 103
Letterwriter	WO 102
PC-Musician	MU 102
City Desk	GE 103
Fingerpaint	GR 103
Desk Commando	UT 101
DOS Tutorial	UT 107
DOS Help	UT 114
Diskette Label	UT 116
Pack PK 102 (10 disks)	
Medlin Accounts	BU 123
Turbo Calc and As Easy As	SP 103
Opus Brain Tease	GA 130
EZX-Write	WO 110
EZX-Talk	TE 108
Mail Master	GE 101
Flightmare	GA 124
PC-Professor	PR 104
Arcade Assortment	GA 118
Home Inventory	GE 106

We recommend these *two packages of ten disks* for those of you who are relatively new to computing. New or inexperienced users should have no difficulty in running these programs, and they will provide fun and valuable utilities for your system without confusing or intimidating you.

Price: Each pack counts as **10 disks**—see our price break table at end.

Word Processing

PC-Write	WO 101	(3 disks) Latest version 3.02 of this all-powerful package with mail-merge and spell checking!
Letterwriter	WO 102	Simple but effective for letter writing—very popular and time saving
New York Word	WO 103	(2 disks) Another powerful WP with split screen, macros and mail merge etc
PC-Style	WO 104	Analyzes style of writing Works with Wordstar, PC-Type+ and ASCII files
PC-Type+	WO 105	(3 disks) WP with 100,000 speller, mail merge and interface to PC-File+ and PC-Style
Galaxy	WO 106	Easy to use WP with menus and quick keyboard commands Fully featured
Bradford 2.04	WO 107	Letter quality output from dot-matrix in over 35 fonts—recommended
Wordperfect Macros	WO 108	Over 80 macros for WordPerfect v 5.0
Mindreader	WO 109	Uses artificial intelligence to complete words and phrases, learns your own style
EZX-Write 2.3	WO 110	Highly recommended VALUEWARE tm—these people are VERY professional
Thesaur V3.5	WO 111	Shareware's 1st thesaurus?—very useful for a variety of applications
Envelope Maker 2.3	WO 112	A really useful envelope printing utility for Epson MX, FX, LQ or compatibles—excellent!
Maxi_Max	WO 113	Another set of useful macros for WordPerfect 4.2—6 dozen macros and templates—get it!

Telecommunications

RBBS-PC	TE 101	(4 disks) Your own multi-user bulletin board system!
Q-Modem 3.0	TE 102	(3 disks) Definitive modem software—excellent package
Procom 2.42	TE 103	(2 disks) Advanced comms for pros and hackers—with redial
GT Powercom	TE 104	(2 disks) Great comms package—another favorite best-seller
Boyan	TE 105	Another popular telecomms package
PC-Dial	TE 106	Flexible package with "smart keys" mini editor and on-screen help
One-To-One	TE 107	Excellent for sharing data by modem
EZX-talk	TE 108	More super-professional Valueware tm comms package—fully featured
Oracomm BBS	TE 109	(2 disks) See the rave review in "Computer Shopper", June 1988—recommended

Educational

Amy's First Primer	ED 101	Latest version 1.7! A collection of routines for pre-schoolers with alphabet, counting, shapes and color
Educational Programs	ED 102	A compilation of pre-school and elementary programs
Funnels & Buckets	ED 103	Fun with basic math principles
World	ED 104	Stats and demography for the globe Fascinating and appealing for all
PC-Professor	ED 105	The definitive BASIC language tutorial for all
Mathpak	ED 106	Lessons & tutorial in higher math
PC-Touch	ED 107	Super typing tutor—most of us need this one!
Kid's Bankbook	ED 108	Serious financial principles for kids, and keep track of their allowance!
Amanda's Letter Lotto	ED 109	Learn the alphabet for 18 months+ children
Flags	ED 110	115 in all, displayed on screen for recognition and learning
Physics	ED 111	High school level—excellent
Spanish	ED 112	(2 disks) Quality language tutor, beginner to advanced
Algebra	ED 113	Both integer and real computations—1st class!
IQ	ED 114	Test and improve your IQ—good for SAT practice too!
Japanese	ED 115	Able oriental tutor—get this a month before you go though!
Spanish Hangman	ED 116	A fun way to learn Spanish—recommended
EZ-Spell	ED 117	Spelling checker
Beginning Spanish	ED 118	Another excellent way to start learning this fascinating language
Bible-Q 3.35	ED 119	A Bible question-answer tutorial with flair!
Pre-School Ed	ED 120	ABC fun keys, Clock & Mouse game, BabyMath, Animal Arithmetic
Whizquiz	ED 121	Problems on elementary math with 10 levels of questions
Kid's Stuff	ED 122	Hangman word game, Mosaic design game Shooting Gallery game
Geography	ED 123	WorldMap, Geochron States and Capitals game
Teen Ed 1	ED 124	Higher Math Trigonometry, Geometry, Biology, Circuitry Pi, Morse Code
Teen Ed 2	ED 125	Algebra, Chemistry, History, Spelling, Math, Astronomy, San Mateo
High School Vocabulary	ED 126	Multiple-choice quizzes with re-testing and clear definitions—recommended!
Time Travel History	ED 127	American history adventure/quiz game plus the US Constitution
Wisdom of the Ages	ED 128	(4 disks) A major work! Worldwide classical data—quotes, thoughts proverbs, epigrams
Polyglot	ED 129	Learning environment for vocabulary for many topics/languages
French I	ED 130	French for beginners—great!
French II	ED 131	Continues where French I ends
German I	ED 132	An introduction to German
Cantonese	ED 133	A tutorial to assist in learning and understanding this fascinating language
Italian & Hebrew	ED 134	An introduction to both of these languages on one disk!
Ready for Calculus?	ED 135	Essential algebra/trigonometry review material
Letterfall	ED 136	Improve your touch typing skills with 16 levels of practice! (I need this one NOW)
Classroom Helper	ED 137	Computerized grade book assignments behavior records, printouts a must for teachers!

# of PC Software from $1.25!

Music

Pianoman 3.2	MU 101	Turn your computer keyboard into a piano keyboard—lots of fun!
PC-Musician	MU 102	Compose, save and play your own music—inspirational and educational
Christmas Songs	MU 103	Play your favorites on your PC—enjoyable at any time of year!

General Applications

Mail Master	GE 101	Good and dedicated mailing list manager for form letters and labels etc
Lotto Master	GE 102	Use the power of math and stats to improve your lottery winnings Proven principles!
City Desk	GE 103	Desktop publishing—simple but effective for smaller applications
Family History	GE 104	Genealogical records and reporting package
Genealogy On Display	GE 105	(2 disks) A complete package ideal for beginners
Home Inventory	GE 106	Keep track of what you own—ideal for insurance records etc
Personal Finance Manager	GE 107	Household budgeting, savings investments, checking etc Comprehensive package
Membership System	GE 108	Necessary material for clubs, societies etc.
Real Estate Management	GE 109	If you own it, you need it!
Astrology	GE 110	Plan your life by the stars and planets—good luck!
Checkbook	GE 111	Complete checkbook manager for home/business with online help—recommended
Dr Data Label	GE 112	Now V3.1b! Another powerful mailing list program with customization of labels etc.
Fastbucks	GE 113	(2 disks) Personal finance manager for checking, saving budgeting payments—comprehensive!
Travel Distances	GE 114	Programs to calculate US and worldwide travel distances
Ace Astronomy	GE 115	(2 disks) Fully-featured program performs calculation and provides physical and orbital data and MORE!
Recipes	GE 116	(2 disks) Great database for your dishes, comes complete with existing menus—VERY popular!
Fast Food	GE 117	Complete nutritional analysis and record of foods sold by major fast-food chains—fascinating
Movie Database	GE 118	Store and retrieve info about your favorites—comes with existing collection
Memoirs	GE 119	A private diary which will keep your special thoughts hidden from others—fun!
Assorted Agriculture	GE 120	A wide-ranging collection of useful decision-making aids for the farmer
Crossword Creator	GE 121	Create your own puzzles—very absorbing, and useful for educators also
Stress & Shrink	GE 122	Stress test and personality analysis
Horse Racing	GE 123	Handicapping for thoroughbreds
Weight Control	GE 124	Programs for losing weight
Catalist	GE 125	(2 disks) Very comprehensive mailing list application—superb!
Select-A-College	GE 126	What to look for, describes colleges and application processes
Personal Poet	GE 127	Create customized odes from a variety of choices—fun for the budding Laureate!
Home Bartender Guide	GE 128	(2 disks) If you like a drink, you'll love these computer recipes!
Nutritionist	GE 129	(2 disks) Evaluate food for the correct nutritional content
Fortune Teller	GE 130	Various programs for "foretelling" the future—lots of fun!
Biorhythm	GE 131	Calculate and print your own monthly chart
Health Risk	GE 132	Diagnose your ailments and recognize your predisposition to common problems
Video Tape Library	GE 133	Catalogue your tape library with this super dedicated database package
Little Black Book	GE 134	Creates pocket-sized address book and prints mini-alphabetized pages
Gardener's Assistant	GE 135	Plan your garden with the help of your PC!
Vehicle Management System	GE 136	Predicts auto repairs, tracks MPG and lots of other useful auto-related jobs
Landlord V2.03	GE 137	Rental management shareware—keep it simple but effective!dir a
MDTS	GE 138	New version "R!" Membership and Donations Tracking System—excellent dedicated package
Computer Darkroom	GE 139	Calculate exposure times for photo printing—multitude of options—try!
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Genesis	GE 141	V1.0 -Yet another good checkbook program, with on-screen check format and good, lucid functionality—shareware
Brother's Keeper 4.1	GE 142	(2 disks) A really excellent genealogy package, with charts, reports and up to 15,000 names!
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Bankonit!	GE 144	Super mortgage and interest calculation program, with prepayments handled—simple to use and informative
Helpful Engineering Pack	GE 145	Calculator-Circles-Area-Polynomial Fit-Helical Springs-Triangles-Points-Stats-Beams-Conversions-VALUE!
T-Best Lbl	GE 146	Nice easy windowed mailing list manager with up to 14 separate databases—needs hard disk
Checkbook Assistant 1.2.3S	GE 147	Very popular and user-acclaimed checkbook management software from Alliz Software—recommended
Video Librarian 2.1	GE 148	Another fully-featured utility for keeping track of your tapes and printing labels, etc.
Book Minder	GE 149	Catalogue your book collection and magazine references with this super dedicated database
Lotto Number Generator	GE 150	Clear, well-presented utilities for helping your chances on the lottery
Lotto Number Wheeler	GE 151	New release—accommodates any state's "pick six" parameters Get it with GE 150!
PC-Lotto 2.41	GE 152	Latest version of this popular and all-embracing package for use with worldwide lotto games.

Graphics

PC-Key Draw	GR 101	(4 disks) New version 3.53 with "hyperdraw" of this magical drawing/art program with tutorial library and many demo files—recommended
Simcga	GR 102	Run CGA progs with Hercules type cards
Fingerpaint	GR 103	Herc or CGA painting program—simple but effective
3-D Imagery	GR 104	Color wire frame package—rotate, move, scale, tip etc
Animator	GR 105	Create animated graphics on your PC for a variety of uses
Dancad3d	GR 106	(2 disks) The best there is for 3-D wireframe with all conceivable options
Iconvert	GR 107	Transfer graphic icons from/to PrintMaster, PrintShop, MacPaint, BLOAD and others
Printshop Graphics	GR 108	3 additional libraries, over 200 additional pics—needs PrintShop
Printmaster Graphics	GR 109	3 additional libraries for PrintMaster
Printshop Graphics II	GR 111	Another 500+ images for the PrintShop program
Printmaster Graphics II	GR 112	(2 disks) Another 500+ images for PrintMaster
Ventura Clip Art	GR 113	(5 disks) Office/business subjects for Ventura Publisher
Database Publisher	GR 114	Compile and print a catalogue of up to 1000 items
EGA Tropical Fish	GR 115	If you have an EGA, then DO get this one—it's a real fun office/home fish tank!
Image—3D V2.6	GR 116	For serious wire-frame 3D—this is a must—very professional CGA, EGA AND VGA!
Megadraw 1.3 EGA	GR 117	Create icons and animation sequences for CGA/EGA, with QBasic source generated!
Ventura Publisher Tutor	GR 118	Disk packed with utilities and instruction for VP—recommended for all users
WP/PM/PCC Clip Art	GR 119	(11 disks) An absolute wealth of art for Pagemaker and WordPerfect 5.0 in PCC format, in 300 dpi res
Draft Choice	GR 120	Super object-based drafting program from Truss with 160 commands! Output to HGPI, pen plotters, HP Laserjet and dot matrix printers

Utilities

Desk Commando	UT 101	Superior and more fully-featured than SideKick—a must!
Epson Utilities	UT 102	Change modes on Epsons and compatibles, with spool utility—useful package
Automenu	UT 103	Make your PC completely menu-driven with multiple password protection
Masterkey	UT 104	Get back those deleted files—like NORTONS utility
Lincomatic Banner	UT 105	Design and print those large banners—hundreds of uses at home and work!
Laser Utilities	UT 106	An assortment of utilities and fonts for you lucky laser owners—great value
DOS Tutorial	UT 107	Master DOS with this able mentor
Still River Shell	UT 108	Easy DOS mastery from a menu!
Batch File Tutorial	UT 109	Learn and utilize batch (.bat) file processing Time saving and very useful
DOS Tips	UT 110	(2 disks) Advanced DOS tutorial
Side Writer	UT 111	Print sideways on your printer—includes source code
Homebase	UT 112	(3 disks) Desktop organizer, database, WP, calendar, appts calendar, cut/paste etc
Speech	UT 113	Get your PC to talk—fascinating program
DOS Help	UT 114	Convenient help when a problem arises when using DOS
Powermenu	UT 115	Superb hard disk menu organizer with windowing
Diskette Label	UT 116	Create labels and filespecs for both 5.25 and 3.5 disks various programs
PC JR Survival Kit	UT 117	A MUST for PC Jr owners RAM disk, spooler, text editor, telecomms and more.
List	UT 118	Instant display of ascii/text files with fwd/bkwd scrolling etc VERY useful
All	UT 119	(2 disks) Power of SideKick Superkey and Norton Utilities all in one package!
Ez-Copy-Lite	UT 120	GREAT floppy duplicator SUPERB PROFESSIONAL utility for mass copying reads disk to mem
Max-Menu	UT 121	Flexible menu system for both beginner and advanced used by Fortune 100 company extensive options inc LAN
Deskutil	UT 122	A good desktop with all the really useful features, doesn't clog up memory with things you don't use!
Disk Wiz 1.31	UT 123	Pop up hard disk/floppy manager, printer control center and editor useful gadgets just a keypress away!
HOM III 2.10	UT 124	Another classic hard disk menu, not memory resident, loads of professional features, network compatible
Maxi Form 1.52	UT 125	Get more space from your floppies! 360K-420K,720K-800K,1.2Mb 1.4Mb,1.44Mb-1.6Mb DOS 3.2 or greater
PKARC/PKXARC 3.6	UT 126	Latest version of this great file compression/extraction tool A must for hard disk users
Direct Maint	UT 127	Nice directory maintenance program from Morsoft nice windows and simple, functional features
Wyndshell 1.1	UT 128	Good DOS shell, with masterful windowing and mouse support try this one!
Menu-Matic 4.0	UT 129	The LATEST version of this menuing package from BC Enterprises
Cassette!	UT 130	Really useful utility for creating cassette inlay cards and adhesive labels A must for audiophiles!

Security And Hacking

Security	SH 101	Bombsquad, Chk4bomb, passwords encryption etc. (10 utils) plus Trojan Horse listings
Unprotect I	SH 102	Make personal copies of protected software
Unprotect II	SH 103	(2 disks) More ways to copy
Unprotect III	SH 104	Unprotect Safeguard protection
Unprotect IV	SH 105	More programs that you can unprotect!

Programming

"C" Tutor	PR 101	(2 disks) Complete "C" tutor with examples ready to compile—very good and comprehensive
Chasm	PR 102	Full featured, user-supported 8086 assembler with tutor—get a move on!
P-Code Pascal Compiler	PR 103	Turbo Pascal P-Code compiler written as an extended subset of Pascal
PC Professor	PR 104	Good BASIC tutor
Basic Program Generator	PR 105	Write programs from menus!—Good for small business database type applications
Swiss Army Knife	PR 106	If you write in BASIC, you'll LOVE these tools—recommended
Turbo Pascal Tutor	PR 107	Learn how to use this great development package—recommended
"C" Compiler	PR 108	(2 disks) Complete programming environment—source, compiler, samples etc —really great value here
Grasp	PR 109	(2 disks) A simple graphics programming pseudo-language
ADA Tutor	PR 110	Interactive ADA tutor requiring HD or 3.5" floppy—professional quality
Hdl calc	PR 111	A very neat hex/decimal/binary calculator—a must for serious programmers
Dprog 1.31	PR 112	First class dBase system generator and documentation system from University Research Inc
Personal Apl 1.2	PR 113	Numerical control programming language for engineering, design and drafting

Religion

The Bible 1	RE 101	(6 disks) King James Old Testament
The Bible 2	RE 102	(2 disks) King James New Testament
Wordworker	RE 103	(2 disks) Memory resident cross-reference/search package—mem resident with paste to WP
Bibamem	RE 104	Quality Bible quiz program—recommended
Inspirit 1.1	RE 105	Memory resident window to provide an inspirational New Testament thought for each day!
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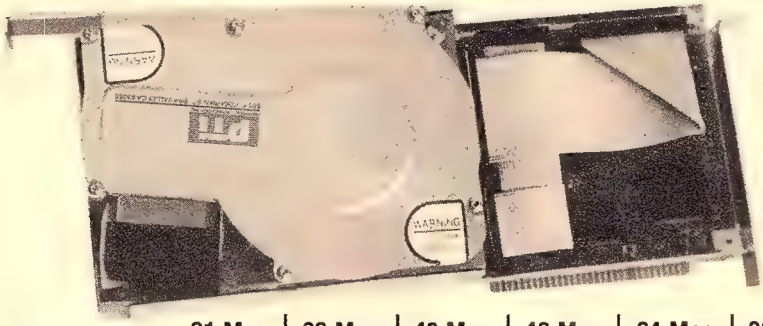

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High Speed SCSI Units	$399.	$429.	$519.	$549.	$689.	$829.	$1199.	$1899.

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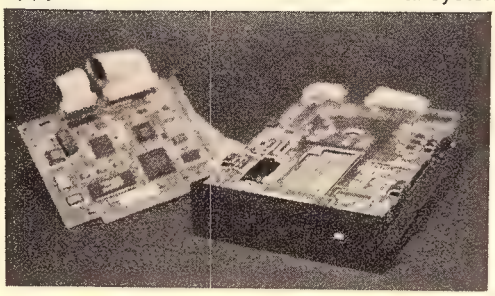
All of the MegaHaus hard drive systems include the hard drive, cables, and controller. Internal systems mount in a floppy location unless noted as external systems.



	For Tandy 1000, A, SX, TX, SL TL, 1200, 3000HL or IBM PC/XT Compatibles	For Tandy 3000, 4000, IBM AT (16 Bit)	For Tandy 1000EX, HX (384K required)
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64 Meg	$429.	$529.	$749.*
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152 Meg	$1279.	$1479.	$1989.
200 Meg	$1599.	$1699.	$2149.*
230 Meg	$1749.*	$1799.	$2549.*
330 Meg	$2149.*	$2199.	$3049.*
660 Meg	$4199.*	$4269.	$5049.*

* Denotes external subsystem with case included in this price.

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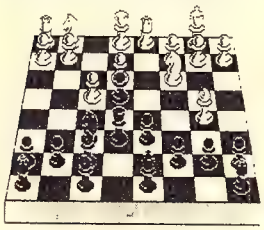

MONOPOLY (118) Great graphics.
DND (119) Similar to Dungeons and Dragons.
GLOBAL THERMAL NUCLEAR WAR (105) A game before its time.
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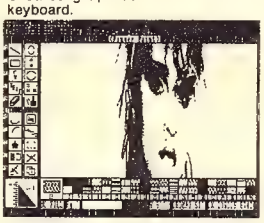

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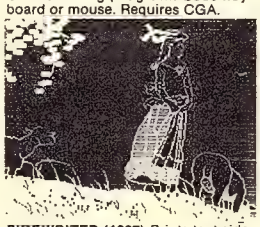

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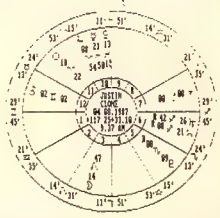

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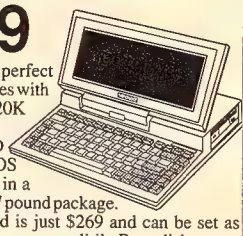

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FoxBase+ 2.10 is simply the fastest dBASE compatible database software available. FoxBase+ also adds many enhancements to the dBASE language. And it's user-friendly too, its FoxCentral uses pull-down and pop-up menus and you can perform every important database operation without programming! There are even LAN, runtime, and 386 versions available.

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1808 PC-PROJECT MANAGER V3.61 - Can handle 1000 tasks, subcontractors, variable start dates, and holidays. Uses the Critical Path Method; calculates the critical path, cash-flow, cost reports, Gantt charts, and Precedence networks. (Requires BASICA or GWBASIC)

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2816 FORM LETTERS - Form letters for home or business.

660 LOTUS 1A STATS/FINANCIAL TEMPLATES - Templates for calculating stock market profit/loss, portfolio analysis, and a checkbook reconciliation template.

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901/944/957 PC-FILE:dB V1.1 - A general purpose database manager. Create databases, produce printed reports from your stored data. Ability to import and export DBASEIII PLUS files.

912/913 FILE EXPRESS v4.22 - Powerful friendly database.

UTILITIES

709 SIDEWRITER - Print text sideways, allowing unlimited print width. Spreadsheets can be printed on one continuous page.

759 HGCIBM v2.02 - Provides owners of Hercules/compatible monographic cards & monitors with a way to run software written for the IBM Color Graphics Adapters. Similiar to SIMCGA (allows you to emulate color graphics with your Hercules or compatable card), but works with more programs.

3408 STILL RIVER SHELL v2.36 - DOS commands from menu.

1906 FASTCOPY V2.0 - Faster than Diskcopy. Includes Jaws.

1903 DOS A MATIC v2.06 -Makes using DOS a cinch. Helps you get the most out of your computer. Combines a point and shoot interface with a multi-tasking facility to run several programs simultaneously.

1940 POWERMENU v2.0 -Acts as a "super highway", providing easy access to any application on your PC.

3461 BAKER'S DOZEN - 13 utilities from Button Ware to help make your life easier. Includes a mini calculator, programmable calendar, file unerase, file compare, a keyboard utility, sideways file printer, sort utility printer redirection utility, a remove subdirectory command, screen set utility, com port switcher, and a printer port switcher.

COMMUNICATIONS

302/326/371 Q-MODEM v3.1a - Modem software. Supports DOS shell, split screen mode, scripting language. Requires 256K+, Color Graphics orMono card and monitor, serial port and modem. 3 disks

SPREADSHEETS

501/516/517 PC-CALC+ v1.0 - Limited only by memory size. Includes sample spreadsheets and tutorial. Spreadsheet can have up to to 26 columns and 255 rows. 3 disks

503/504 EXPRESS CALC v3.14 - This is an easy to use "Visible Spreadsheet" program. If you work with numbers, at home, on the job or at school, ExpressCalc is for you. Up to 65 columns by 256 rows. Linked spreadsheets are "3D" capable. 2 disks

510 QUBECALC v1.01 - QubeCalc is a TRUE three dimensional spreadsheet, lets you link cells of multiple spreadsheets together). It gives you the ability to look at your data in more ways than you ever imagined.

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3203 DESKTEAM v2.01 - Great memory-resident desktop organizer which eliminates devices that take up desktop space. Includes a calendar, alarm clock, calculator, typewriter, and phonebook.

3222/3223 HOMEBASE v2.0 - Desktop organizer, to use while other programs are active, plus perform communication tasks. Functions include DOS services, linear database terminal communications, calculator, & cut & paste operations. Requires 256K and 2 disk drives. 2 disks

3233 PERSONAL ADDRESS MANAGER - Sort by name, address, phone, Co. name. Does 14 different printouts.

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703/704 KEYDRAW CAD SYSTEM V3.22 - Create graphics. Requires CGA. 2 disks

755 IBM PC PICTURE GRAPHIC SYSTEM - Extensive library of graphic pictures to incorporate with text. Supports different fonts, flowchart symbols. Requires CGA.

791 MANDELBROT MAGIC - Fractals.

794 EDRAW - Schematic, diagrams, flowcharts, circuit boards.

1964 PC-DRAFT II 3.20 - PC-Draft II is an applications program which produces clip-art text & graphics from other programs. Pictures produced can be printed out on most printers. Export function for external Desktop Publishers.

746 DANCAD-3D V1.30 - Do stereoscopic dimensional wire frame animation. Works well in the production of line drawings and graphs as well. (Requires CGA & 640k)

3538 FINGERPAINT V1.0 - A full featured graphics art program. Draw line, magnify, swap text, fill, make circles etc. Req. 200K. EGA, CGA, or Hercules compatible.

2917 FONTGEN - Create fonts for Epson FX, IBM Proprinter or compatible printers. (Requires Color Monitor)

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1713 HOME INVENTORY PROGRAM V2.0 - Keeps track of your things. Docs Inc.

873/875 FASTBUCKS v4.05 - Home finance. 2 disks

2307/2308 THE FAMILY HISTORY SYSTEM -Great geneology program. Keep track of family/generations.

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2001 ESIE (EXPERT SYSTEM INFERENCE ENGINE) V1.1 - Explore the futuristic world of knowledge based systems and create an expert system. Great documentation.

223 ELIZA V3.0 - Psychotherapy program.

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203 SPACEWAR v1.72 - 1 color version, 1 Hercules graphics card version, LIFE, the display hack with Turbo Pascal source & other BASIC programs.

213 CASTLE ADVENTURE GAME - With graphics, MEMBRAIN RAM disk software.

215 TRUCKER - Drive an 18 wheeler from LA to NY. Watch out for Smokie!

233 BASIC GAMES - Pac-Man, Lunar Lander, Startrak, Jailbreak, Meteor, Fence, and Breakout. (W/ source code)

256 ROUND42 - Better than Space Invaders! (Requires Color Graphics Adapter)

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2248 BRIDGEPAL V1.1 - Requires 256K+

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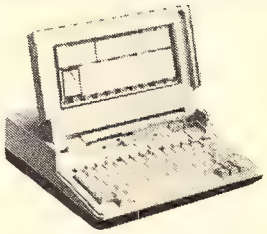

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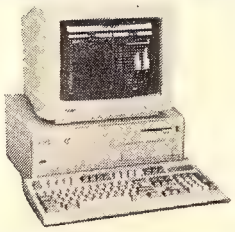

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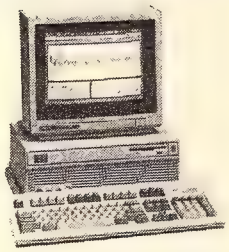

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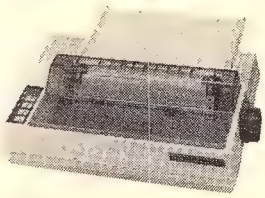

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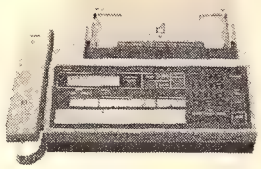

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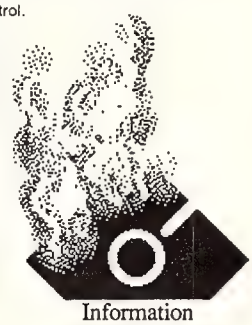

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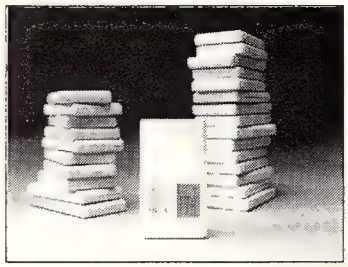

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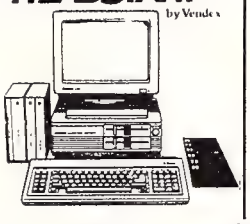

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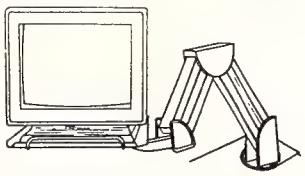

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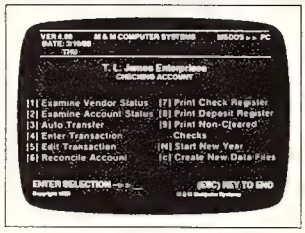

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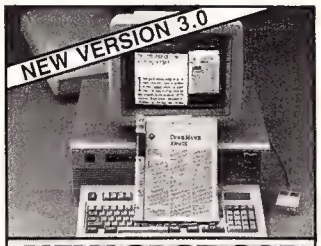

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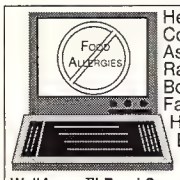

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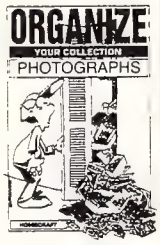

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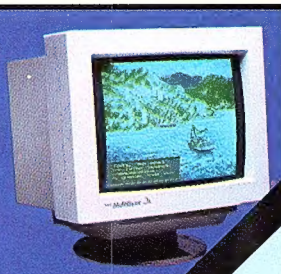

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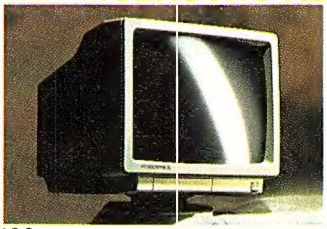

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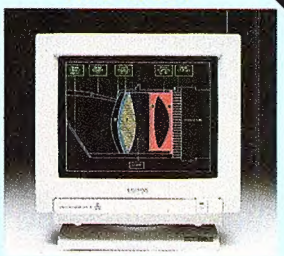

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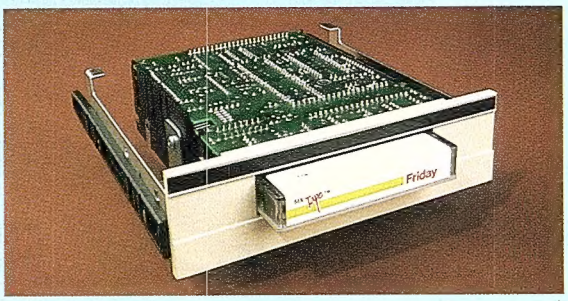

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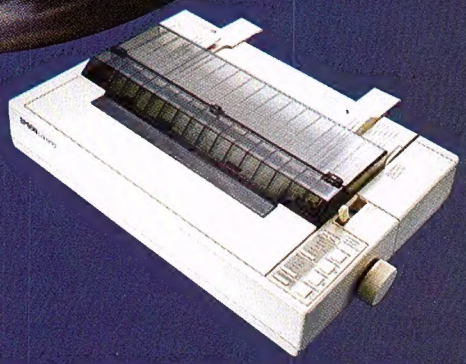

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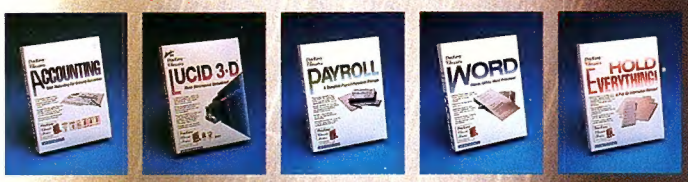

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